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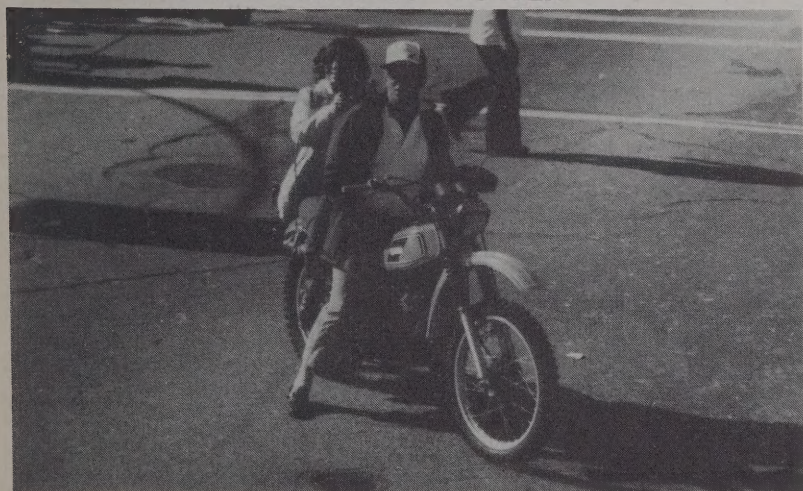
AMATEUR TELEVISION MAGAZINE

Vol. 10, No. 2

ATV OPERATIONS - WHERE, WHO & HOW.

MICROWAVE ATV

BUILD A HOME BREW 60' TOWER



— Photo by WB6MEU.

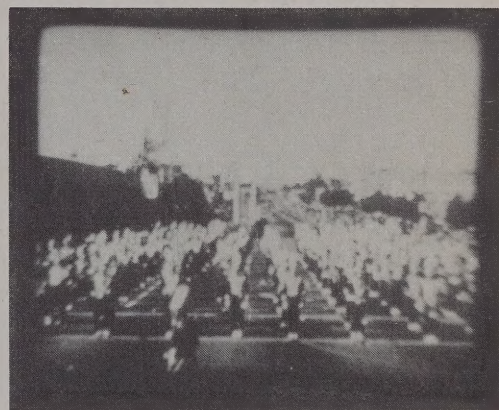
Rose Parade ATV coverage - Tom W6ORG & Maryann WB6YSS



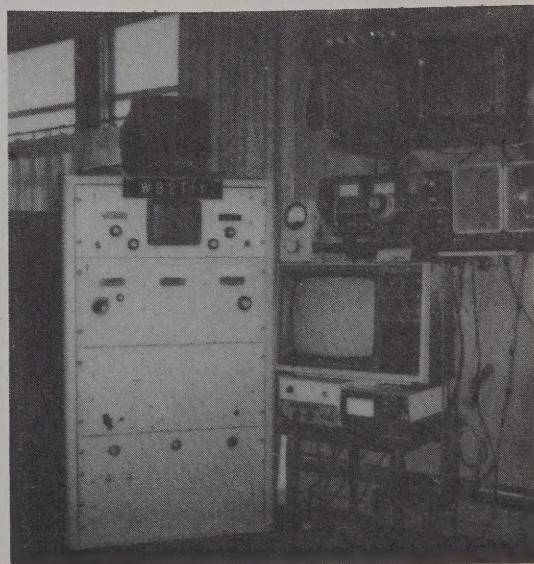
Cockpit to cockpit ATV.

AUSTRALIA'S ATV REPEATERS

DAYTON ATV REPEATER



View through Maryann's Viewfinder.



WB2TIY's ATV shack.

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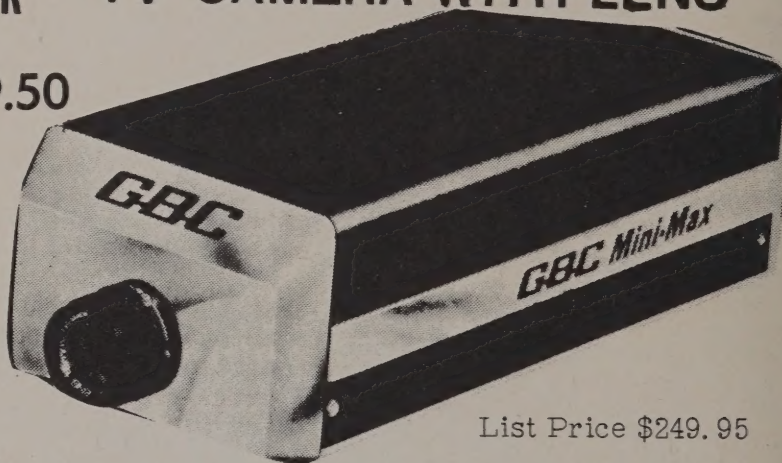
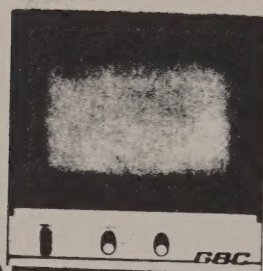
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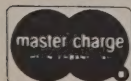


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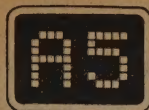
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DEVOTED TO HAM TV

Published bi-monthly by Henry B. Ruh KB9FO. United States Postal Service publication number 944960. Mailed as second class matter from Topeka, Ks. 66601 and elsewhere. Principal offices 7391 W HWY 46, Ellettsville, IN 47429. This publication is copyrighted and the publisher reserves all rights. Persons desiring to duplicate or reprint material may obtain permission to do so by contacting Amateur Television Magazine. Blanket permission is granted to amateur radio publications to reprint news and editorial items without prior consent. Those so doing are requested to provide source credit.

Amateur Television Magazine

All correspondence to:

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Ellettsville, IN 47429

NEWS

APOLOGY - "SORRY 'BOUT THAT CHIEF"

If nothing else, the last issue (January 81) was a perfect example of how not to put together an issue. Several months ago we purchased a new IBM model 75 electronic typewriter in expectation that its electronic memory would enable us to edit copy without having to type everything twice, and liquid paper the page to death to correct for my hunt and peck typing. Well....such was not the case. We have had nothing but trouble with it since it arrived. First, it wrrived with a defective power switch and the letter Y would not work. The paper bail fell off three times. The memory was lost every time the power went out, even for an instant. The editing functions often quit in mid page. Then the memory itself started to go bad. We would enter a letter perfect copy into the machine and when we asked for a print out, it would make its own typos. It would often insert a - for a letter, or substitute letters, add capitals, not underline, the letter y would often print as e, the letter e would be printed as a ;, etc. For the last issue it also took upon itself to advance the paper, then slowly the paper would creep down and the line would be overtyped. It would often extend the left margin an extra space on return. Needless to say, as you saw, the issue was a disaster from the standpoint of errors. Well rejoice!! We have convinced IBM to take their machine back and refund our money. With the refund we have HIRED A TYPIST!! Hooray!!!! This is the first issue which has been completely retyped by Sue Kurnan of Evanston, Illinois. I hope this makes everyone happy, it certainly has helped at this end. While typesetting is expensive, we have found that for about \$50 per issue we can have it professionally typed. She naturally, is not familiar with ham radio and so some errors may creep in and an occasional typo may still get through, but on the whole, look for a great improvement in our copy.

NEW AREAS

To RTTY or not to RTTY that is the question.

I have often thought that a single publication which covered all the special modes would be a neat thing to have. A5 has made two attempts over the years to buy the RTTY Journal and has not been able to make a deal. We have had several readers comment that they would like to see RTTY and Computers covered since both are now in the video age. Well, I don't think we can compete with the computer mags since they have lots of \$\$\$ but I do think that we could add a section to A5 (an additional 8 pages) which would be devoted to RTTY. Our other option would be to start a new RTTY only magazine. What do you think?? I would really like your opinions and help in this decision, after all, A5 is YOUR magazine, what do YOU want us to do???? Send your comments to Mike Stone PO Box H, Lowden, Iowa, 52255. Mike used to write a column for the RTTY Journal and has since quit and joined A5 covering SSTV in regular features which have been well received.

While on the subject, we ALWAYS need articles and news on all of the video modes, FSTV, SSTV etc. We often get letters saying why don't we have this or that, well we can only print what we receive. We try to provide a well rounded issue each time, but often one well or the other is dry. Our goal has been to present over the period of a year, equal amounts of fast scan and slow scan material. We also have tried to cover all other video aspects such as MDS, Satellite TV, Medium Scan, Color and other related topics. Let me know what you like and what you don't like. We aim to please but can't do it if we don't know what you want.

NEW BOOKS

NEW NUTSHELL is being outlined. What would you like to see in the new book which was or wasn't in the first? Let us know NOW. Old circuits will be cut out, new ones added. Color? different types of projects (aids, cameras, switchers, etc)? Also, should we put out a handbook for SSTV? What price range should the books be? let us know!! Our cumulative index is nearly done and will be in an issue soon, watch for it!!

AUSTRALIAN ATV & ATV REPEATER

I have just received my May-June edition of A5 via "The Pacific Delay Line" as we all call the surface mail service between VK and K! Looking forward to the next issue to see the UK ATV info you promised-I guess most from the ATV Repeater Survey reply I sent you. Congrats on an interest-packed issue; I've just read it cover to cover.

You may be interested to learn that as the Wireless Institute's (VK equiv. to ARRL) Federal Videotape Coordinator I have been promoting an ATV news videotape with contributions from ATV groups around VK. We've also swapped tapes with the British Amateur TV Club who as you may know operate on the same 625 line, 50 field PAL color system as we do.

It occurs to me that it would be fun to arrange a similar exchange with you in the USA, however the difference in TV standards is a problem. I wonder if you could ask the readership of A5 if there is any ATVer who, by the nature of his employment, has access to a color standards convertor, and who would be prepared to convert one tape each way gratis once or twice a year?

Because of my WIA job I can guarantee wide distribution this end via a well utilized arrangement through my work-place. I wonder if there is a similar distribution system in operation via perhaps the ARRL or if someone could be found who could look after your end? Programs immediately available which would be of interest: B.A.T.C., 1978; their 1980 reply just received; a 20 minute tape just made here demonstrating over 160 mtrs. an operating example of Low Definition TV to the same line standards used by John Logey Baird back in the 1920's! And our latest local news tape is due to be completed shortly. Airmail Parcel Post across the Pacific is quite expensive so we wouldn't want to do it more often than once or twice a year, but that would, I'm sure, create a lot of interest at both ends. What do you think?

The V'matic format is what we use here for this type of thing -- although it is heavier than VHS or Beta it is more widely distributed both here and around the world and lends itself better to editing without too much loss of quality.
-- John Ingham, VK5KG, Sefton Park, Australia

Thanks for your recent letter in which you expressed interest in our ATV repeater. It's been operational now for just over 2 years and has proved a boon to ATV activity in the Adelaide area. The most important characteristic in this, which alas is not open to you, is that the output frequency is within the VHF broadcasting range and is thus accessible to any viewer with a standard domestic TV set. Because of this our numbers have grown in 2 years from

6 Tx stations, 0 Rx only stations to 15 Tx stations and about 70 Rx only stations. There are other less obvious benefits. Because of the split-band operation, it is easy for an inexperienced ATVer to see himself coming back from the repeater and thus to make whatever adjustments are necessary. Usually, no special steps need to be taken to allow simultaneous transmission and reception-at worst all that is needed is a couple of coax. stubs. This is one of the unexpected but most valuable assets of our repeater.

The expected (and confirmed) advantages are-no more beam swinging-it is now practical to send out a CQ ATV call to all points with a good chance it will be copied and answered. No more receive converter tweaking for each newly received station-they all come in on the same setting, any tweaking needed is done by the Tx station monitoring his own pix. No more searching for pictures in the noise-most stations are line of sight to our repeater site and most signals are almost snow free, a far cry from the lousy trans-suburban paths we were used to.

I could go on and on, but I don't think I need to, you've already decided to build one of your own. I'm not sure how much help we can be to you-most ATV repeaters (and repeater projects) in VK utilize whatever hardware happens to be on hand and I think such would be the case with you. However, I guess it is useful to learn of the other fellows' approach so I hope that the following is of some help to you.

Before getting stuck into it I should first explain a few things. While our ATV repeater was originally started as a result of a letter I wrote from Canada (where I lived from 1969-73) it has been built by many hands. Even so I must say (as modestly as I can) that most of the innovations in operation and planning have been my brainchildren. Perhaps I have too much imagination-I have been called a dreamer-but many of my ideas are already in operation and others are on the verge of being implemented with the help of others. We have now a very sophisticated repeater, and changes soon to be made will complicate and diversify it further. DO NOT BE PUT OFF BY THIS. YOU CAN MAINTAIN A MOST USEFUL SERVICE AT A MUCH LOWER LEVEL. Obviously our repeater started simply & we've built it up as we have gone along. Originally, we had Antennas-2 sets of stacked dipoles (8 per set). Receivers consisted of a B&W TV set with a Rx Conv. in front. Transmitter control was by a Schmidt-trigger driver off the AGC line. Transmitter, all tube ending in a grid modulated 6252. No special filters were necessary for reliable operation. However, since then, we have increased Rx sensitivity, added video and audio ID generators and added a more complex control setup. We have used a micro-computer for just one year to control the operation of the repeater and we are very pleased

with its performance. Upon receipt of a signal it switches on the tube heaters, waits 90 secs., activates TX, sends color bars + video ID "VK5RTV" Repeater + Audio ID in CW then switches to "repeat." If the incoming signal should go off it transmits color black for 5 secs., then color bars + video ID until a total of 5 mins. (or multiple thereof) has passed when it identifies itself in CW, adds QRX and deactivates the TX. The QRX informs users that the heaters are still on ready for instant use. If no further use is made of it, in 30 minutes it reactivates itself, flashes the ID 20 secs., then sends "TIMEOUT" in CW, flashes a further 10 secs., then "VK5RTV QRT" and closes down completely. On the other hand if the incoming signal recommences during the "flash" mode the repeater resets its timeout time and goes into the repeat mode. At 5 min. intervals it visually identifies itself up to a maximum of 30 mins. at which time it flashes its video ID as before. The incoming station is required to momentarily drop his TX to allow the repeater to check that it can go off the air (i.e. isn't "hung up") whereupon the timeout timer is reset and the user is given a further 30 minutes of operating time.

To reduce the access time during the evenings when most activity is expected, the microcomputer automatically preheats the heaters between 7PM and 11PM local time. In addition, as an aid to receiver alignment color bars and visual ID are transmitted each evening (in the absence of other activity) between 7:45PM and 9PM.

The B&W TV set has been replaced by a JVC tuner-timer as used by educational institutes for recording color videotape affairs. In addition a low noise preamplifier (1.6db noise figure) has been mounted along with an interdigital filter adjacent to the Rx antenna.

For detection of a received signal we now use instead of a Schmidt-trigger off the RxAGC line, a sync. pulse separator followed by a phase-locked-loop H rate detector. This is so sensitive (and immune to false triggering) that weak DX signals make their presence known well before any picture can be discerned. In such a circumstance we can switch to a higher gain directional Rx antenna (by means of a touch-tone code transmitted on 2m) and swing it towards the Dx station concerned. The extra gain is enough to enable the picture (and call-sign) of the station to be clearly seen.

The power output was boosted about a year ago and we now run about 50 watts peak sync. tip output from one of the 8874 family of tubes. This is fed into an interdigital filter to

remove the lower sideband and remove any out of band emissions. All of the above is in actual operation now.

The next change to be made is one which will substantially change the whole repeater. In particular we will be installing a completely solid state transmitter a description of which appears in a copy of the ATVer (a little mag. put out by one of the local boys) which I have included for your interest.

In addition we are waiting for licensing approval to go ahead with the installation of a SSTV-FSTV converter similar to the Robot Model 400. This will allow an average ham to retransmit on 2m. SSTV he has received on HF and see the pictures converted for him to FSTV coming back from the ATV repeater. Similarly, upon receiving the appropriate touch-tone code, FSTV received on VHF will be converted to SSTV on 2m and thus be available for immediate retransmission on HF or recording as appropriate.

To control all the new facilities including beam tuning to designated headings we will install a second microcomputer whose job it will also be to generate all the video IDs from now on. This will enable us to receive telemetry directly on the downcoming picture plus such exciting future facilities as RTTY display (to provide a service similar to the SSTV one previously outlined) and remote programming and the use of the 2nd microcomputer. This last would enable an amateur with only an ASCU keyboard, a 2 meter transceiver and perhaps an audio cassette recorder, to run programs on the repeater computer, using the down link picture as his VDU!

Unless you are prepared to tackle the FCC you will not be able to proceed as we have done (even our O/P frequ. is only a "temporary" allocation until required for broadcasting). However, I urge you to consider the advantages of a cross band repeater. The most practical bands for you are the 70 and 23 cm. bands. I suggest that you consider 70 cm. up and 23 cm. down for the following reasons.

The repeater's Tx and Rx antennas must have as high a gain (and in the case of the Rx ant. a high effective capture area or aperture) as possible. However, there are practical limitations to what can be built by amateurs using techniques usually available to amateurs. A high gain omnidirectional antenna can only be built by reducing the vertical angle of radiation, controlling the angle of tilt of the main lobe and eliminating the minor lobes. This is a very exacting task. Our 8 stacked H pol. dipoles serve Adelaide well with their figure 8 pattern.

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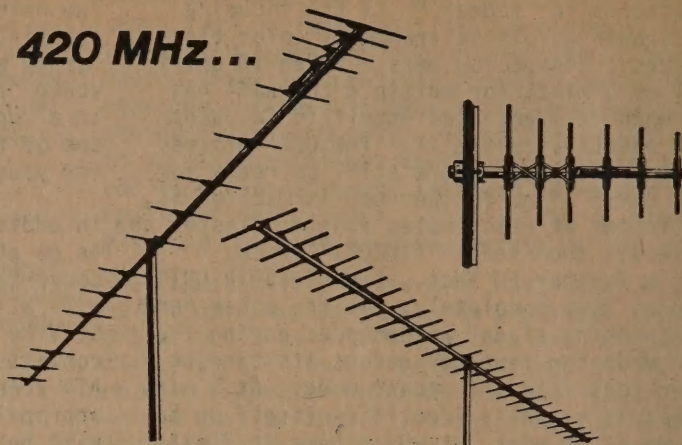
14-Element KLM-144-148-14 \$65⁹⁵

Gain: 14.2 dBd. Beam width at 3 dB pt.: 18 degrees. Feed impedance: 50 ohms balanced (KLM 1:1 Balun, 144-148-50 optional). Boom dia.: 1½". Boom length: 17.33'. Max. mast size: 1½". Center mounting. Wt.: 8 lbs.

16-Element KLM-144-148-16 \$72⁹⁵

Gain: 14.8 dBd. Beam width at 3 dB pt.: 16 degrees. Feed impedance: 50 ohm balanced (KLM 1:1 Balun, 144-148-50 optional). Boom dia.: 1½". Boom length: 20.66'. Max. mast size: 1½". Center mounting. Wt.: 10 lbs.

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6-Element KLM-420-470-6 \$19⁹⁵

Frequency: 420-470 MHz. Gain: 8 dBd min. F/B ratio: 20 dB min. Beam width at 3 dB pt.: 30°. Feed impedance: 50 ohm balanced (Balun 420-470-50 optional). Boom dia.: 1". Boom length: 2'. Mounting: End or center; horizontal or vertical. Weight: 1.2 lbs.

14-Element KLM-420-470-14 \$31⁹⁵

End mountable; vertical or horizontal polarization. Excellent for repeater control. Frequency: 420-470 MHz. Gain: 13.7 dBd. Beam width at 3 dB pt.: 24°. F/B ratio: 20 dB min. Feed impedance: 50 ohm balanced. Boom dia.: 1". Boom length: 4.75'. Wt.: 4 lbs.

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We could go to 16 or even 24 elements but with diminishing returns. For a given number of elements on a Rx antenna, an antenna resonant at lower frequency delivers more u Volts of received signal than one at higher frequency all other factors being equal. Or put another way, for a given required received signal strength a higher frequency antenna needs more gain (= elements) than one at a lower frequency. And to build an omnidirectional repeater receive antenna of sufficient aperture at 1296 MHz. would be a nightmare of a task for amateurs.

However, if 1296 Mhz (or thereabouts) was used as the down link frequency it would be up to the individual receiving user to supply sufficient gain and apperture for his particular location by the use of high gain arrays (e.g. phased, dish, corner, etc.) without the need to worry so much about control of minor lobes, tilt angle etc.

The higher technology required of the receiver on 23 cm. can be overcome by making available inexpensive strip line convertor kits or pre-wind units, possibly mast-head mounted and IF-tuned down below by a standard TV set.

Such a system would also allow the more expensive section of the individual ATVer's gear, the TX, to remain at a lower technology (and expense) level.

Before describing our repeater in detail, I'd like to suggest one other thing. I notice from your QSL card that you operate SSTV/FSTV both from home and mobile (I too operate color FSTV while mobile via the repeater!) We have swapped Vmatic videocassettes with the BATIC in the UK. It is quite expensive by air mail and in any case such an exchange would be difficult because of the TV systems differences. We can play on special Vmatic machines and specially modified monitors tapes made on the US NTSC system. I could probably record (in B&W) a simple news type tape in 525 line 60Hz. However, it would limit what I could send. I could send compact audio cassette tapes with SSTV (converted from FSTV) on one channel (left?) with audio narration on the other (right?). Similarly, tapes you send me could be re-converted to FSTV and played to the gauge here. Of course we could also exchange SSTV on 20 m. but with the likelihood of QRM and the lack of sync. sound. I think the cassette SSTV would be better and cheaper than the Vmatic too. I have a lot of suitable material here on videotape.

Right now, at this stage, I refer you to the Block Diagram of VK5RTV. Immediately some similarities should appear between this and the block of WR4AAG as published in May-June 1977 of A5. This is not because we copied said station--we didn't know of its existence when we started. It's just that we have chosen to solve the problems of an ATV repeater in much the same way. Some of the units shown are quite standard and are shown in a number of textbooks. Others are obsolete and soon to be replaced (notably the whole TX). So the only details I have included (bearing in mind the high cost of airmail) are those items which may be of interest to you. These are-- A copy of the latest "ATVer" showing the design of a 70cm. interdigital filter, and its swept response, a description of the new TX and mods. to the video ID generator. Design sketches for the RX and TX antennas. Get of the RF sensor for the "Tx On" data. A Video ID generator. The circuit for our original hardware controller.

The latter works well--it looks haywire but follow the logic through and you'll see that 3ICs, 3 relays and 5 transistors can be made to do a lot! The additional circuitry was never adopted because we went to a microcomputer controller. I've also included a sketch of a sync. detector which has proven most reliable.

Best of luck and good ATV viewing & Txing!
-- John Ingham, VK5KG, Sefton Park, Australia



FOR SALE: Military UHF D Band cavity, A high power UMF amplifier for ATV. Unit includes a tube for video and one for audio. Good for about 300 watts on 450. Includes power supplies. Very heavy. Contact Randy Smith, WB8WNV/4, 2020 Continental Ave., #706, Tallahassee, Florida 32304 - 904-576-4222.

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-- Dave Withrow, KA9BRQ, 1609 216th St. Sauk Village, IL 60411 (312) 758-1547

COMING NEXT ISSUE:

CUMULATIVE INDEX- A5 1967 - 1981

**HOW TO MAKE PROFESSIONAL PCB'S
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ATV OPERATING NEWS

In Orlando, Fla. (at present) there are three active ATV stations with 2 or 3 more due on in the very near future. W4TOD, W4DPM and W4QOC meet every night at 2:00; Local (EDST) on 439.25 MHz. TOD and DPM are in color. W4QOC is B/W. W4TOD runs 40 watts, W4DPM runs 20 w. (output) measured at the X meter. All use high gain beams (15 DG) ranging in height from 40' to 70'. W4TOD is using Aptron & KLM; W4DPM - P.C., VHW & KLM; W4QOC - P.C. Electronics and KLM.

-- A. McKinniss, Orlando, Florida

Here are a few notes to let everyone know things are alive and well on A-5 here in South Jersey. July 6 we completed an aero ATV demo with about 4 ATVers watching on the ground, K25MZ, WB2DGJ, N2BCX, WB2BWL, we hope to have more on the next trip.

Frank, WB2JMA did the camera work during the one-hour flight, while I did the flying, a piper arrow at 2,500 ft. All went real well, we used the VHF Eng. xmtr with the Motorola 710 module. Ant. was the dipole from an 11 El. Beam taped to the inside side rear window. All stations received P4-P5 pictures from the GP5 camera.

Presently we have about 7 active ATVers in South Jersey with about 3 more setting up to get on.

--73s Ken, WA2GIW

The three of us are in the midst of constructing a TV repeater on 439.25 in/426.25 out. We hope it will be capable of passing color. We are combining two transmitters in a Hybrid and then amplifying on up to 100 watts where a 5 pole digital filter will clean it up.

At the present time Don and I can work the Baltimore, Washington DC, New York and Conn. (very new) repeaters when the band is good. Seems we have very good propagation up the coast.

We are very interested in working long distance (400 mi.+) contacts. Hope this is some news for A5. We also have several other hams coming up soon to join us in the area. I hope you can believe all this. Just ask the fellows in Baltimore about us down here in Virginia.

-- Angie, W4WIN

I have been a ham for over 16 years and until recently never was directly involved in any form of receiving or transmitting pictures thru amateur radio. I have followed the growth of SSTV for several yrs. and felt I could not afford to get involved because of the cost, as many hams I'm sure feel. I now have a Robot 400 scan Converter along with a Panasonic camera. I am like a lot of amateurs who get involved in something new to us like TV and want to learn as much about of this part of amateur radio as I can.

This being the first letter I have ever written to any magazine publisher, ham or otherwise, I want to express my enjoyment and interest in A5. I find all amateur TV exciting and within my reach technically but not financially. Most of my time is being spent with SSTV. I have three brothers who are hams and will be on the air soon with SSTV as well. I am hoping to experiment with color SSTV soon and will let you know how I am doing. Keep up the good work and thanks for a very nice magazine.

-- Ron Curry, WA4GSS

I wanted to give you a little news from this part of the world since you probably don't hear from hams in Virginia very much.

We have three FSTV operators in the tidewater area. Myself first, my call is W4WIN located in Norfolk, VA. XTMR: modified GRT-20 running 50 watts max. driven by a VHF Eng. XTMR strip on carrier & subcarrier audio. Feedline: 1/2" heliax up an 85' tower. Antennas: stacked pair of J-beams 88 elements each, total 176 elements. REUR: 3 pole digital filter followed by PA432-5 preamp by Lunar, followed by SI Converter to a Sanyo television and a VTR by RCA (VHS). Notes: 7 states worked, best DX was a contact with WA1VNX in Conn.

Next is W4YDF (Don). Don is located also in Norfolk and is running the same equipment for XTMR and receiver. His antenna is 60' and one 88 element beam. He has also worked the same station in Conn.

Finally WA4J2X (Joe) located in Elizabeth City, N.C. about 30 miles from Norfolk. Same transmitter and receiving set-up. His antenna is a 27 element KLM beam at 400 feet! He is using 7/8" foam hardline but isn't doing so well on receiving due to loss.

SAN DIEGO NEWS: ATV is growing a little in San Diego County. We have WB7AJC, Mark, on the USS Tuscaloosa, who sent us a picture with a signal generator, recorder and a camera. WA8KKY, Dennis, W6ZVM, Bill, and WB6TPJ, Joe. Another new ATV'er is W6ODE, Bob, in Lemon Grove, who is receiving us fine and is now working on his transmit. We still have our 3rd Saturday of the month breakfast, and have 5 to 10 fellows turn out. One of our members, WA6AXO, Frederick, broke his leg. W7ZUM, Bill, is also a new ATV'er, in La Mesa. WB6QDS, Dave, in Santa Barbara, checked in on 2-meters also.

--Bob, WA6JCG

NEW MEXICO AREA NEWS-ALBUQUERQUE: To be quite frank, there is no ATV except myself in Albuquerque at this moment. The two stations contemplating operation are just finishing a 6-meter repeater which will be used for audio. I do not think that they will be overly successful with video, as they plan on using an RCA rig--T44, I believe. I was all set for operation with a CMU-15, varactor converter, DX-420 and Panasonic monitor (internal Video), until this afternoon. The shack is in the process of being packed up for my return to Southern California, in January, hopefully on ATV by April. My job has a big bearing on the date. Hope to get an ORG rig on the air and you might see me in funny colors from Orange County. In any event, it will be good to get back to the capital of ATV. As I can't help you with any news, circuits, etc. for the paper, I'll only comment that you have done a fantastic job upgrading the quality and content of our Newsletter. Keep up the good work...

--Don, W700H

MT. WILSON NEWS: The crystal control downconverter was installed on Nov/12/80, but the next day intermod was noted from out-of-band signals and the 2-pole filter was not adequate for the new converter. A 4 pole filter is under construction. Control Logic is complete with 6 User Functions, and control functions...

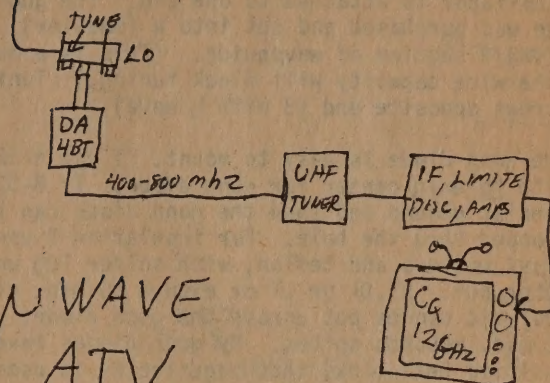
Mike, WA6SVT

ORANGE COUNTY ANTENNA RAISING: ...10 people unselfishly gave of their time and talents to help out a fellow ATV'er. The antenna raising took place at Nate Hooker's QTH, WA6MPI, in Santa Ana. As Sec/Treasurer, wish to thank each and everyone involved in this event.

-- Diane and Dick

East L.A. NEWS: Dave, W6QDP, bought a 1 KX amplifier from Tom, W6ORG. Last month Dave said it was for DX. But I think he just bought it to keep warm this winter. An ATV demo was given at the Monterey Park Radio Club, on 6th of Nov. by Mike, W6SVT, Doug, WB6CMW, and Frank, WA6JEY, Ed, KB6OW, was ill and could not make the meet-

4" TO 3" FLAT BRASS
NO HORN



N WAVE
ATV

Paul W3AED

I am subscribed to A5 magazine and enjoy it. My interest now is exclusive with microwaves. Presently I am just about ready to test for 12 and 11 gig signals. You might be interested in my setup.

For a long time I had converters here for 4 gig, 6 gig, and 8.2-12.4 gig, and home constructed converters for 11 & 12 gig. However, I found out that all these converters were worthless without an antenna, so I dropped all the inside equipment and went looking for a parabolic antenna. I located one in neighboring state. It is 6' commercial type designed for 8000 mhz. Just to have something to do one day I connected can feed antenna at 1296 for feed, and we had a job getting far enough away from the antenna to keep the meter from blowing out. A later test at 11.7 gig from Gunn oscillator feed into 18" horn have reading on 50 MA meter at close range. When the horn was moved back away from the parabolic the reading started increasing until it got over 1 mill, as the horn signal saw more and more of the 6' parabolic.

Feed systems have been made up so the mixer could be located at the focal point, with tuner, mixer, gunn oscillator. However, for first test I plan to use the (?) type feed from back of parabolic, and flexible waveguide to inside (short distance) as parabolic is located on the ground for satellite signals.

A lot of work was put on AZ-EL electric controls, and now both can be controlled from inside. (gearhead motors into 2" pulley into 4" pulley, attached to a 3/4" stainless steel allthread, with traveling nut. Right angle cross springs (ss) at each end which light #47 built to indicate end of travel. A metering circuit used to exact location other than ends. This later circuit is difficult to design for linearity.

CON continued >

MICROWAVES FOR ATV

Now we come to the inside schematic of my 12 gig receiver. The 8.2x12.4 waveguide WR90 .4x.9 is about 5' long with flange at each end. A gunn oscillator is attached to one end. The gunn diode was purchased and set into a (smaller) 3/4x3/8 section of waveguide. (This is a must; otherwise capacity will block tuning.) Tuning screws opposite end (3 with $\frac{1}{2}$ wave)

The gunn diode is easy to mount. I use 6-32 with hole in center for gunn diode. If 8-32 is used at ground end then the gunn diode can be dropped thru the hole. For insulation I use two brass washers and teflon, with solder lug under outer nut. A .01 or .1 or even a 50 mfd. electrolytic can be put across the gunn diode. The 50 mfd. absorbs spikes. My gunn diodes have positive heat sink, thus negative B+ is used.

For power supply, one of the good CB 3 amp supplies (with ungrounded B- or B+ is excellent), Following this I use a 4 terminal regulator of the pot controlled variable type to give necessary 7-8 to 12 volts, etc. Of particular note is that the Heath CB power supply has blown a few gunn diodes for a friend of mine.

Now to the mixer diode, I used the ends from RCA TV wall connection. Just a shielded housing as the 1N23 type diode sticks up thru the waveguide even though the pin is sticking thru the waveguide (ground end). A clip of some sort at the ground end is nice. I use TV type "F" fittings throughout. The BN type fittings should all be dumped in the Ocean. My thought, especially if you try to make one up. Here it would be nice to have a way to go from the 200-400 impedance of the diode to the 75 ohm coax cable (I.F. freq.). A short distance from this mixer (short coax) install one of Winegar's DA405 UHF TV amplifiers. Has lots of gain, and most important it has a DC feed thru which allows reading of the mixer current at some later point along the line.

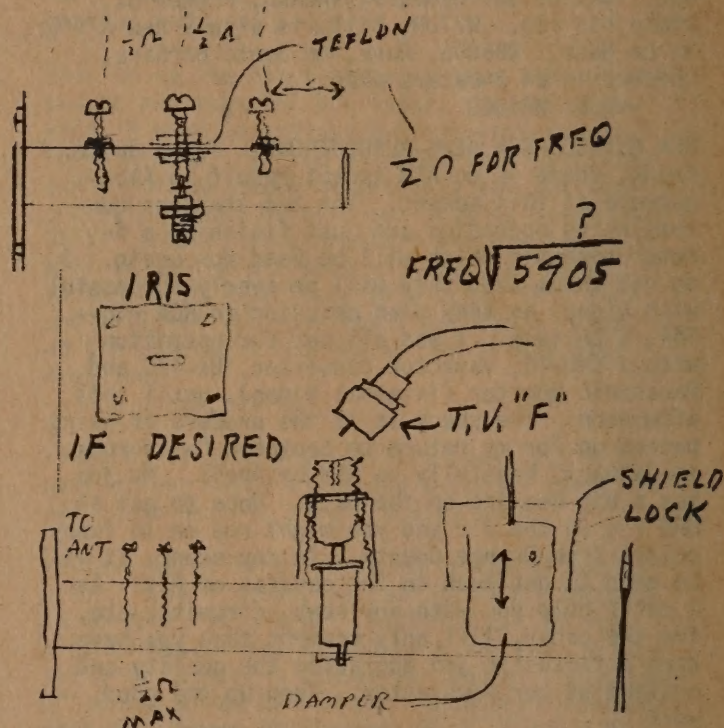
From this I go to UHF TV Converter. One of those old time UHF converters that used to set on top of the TV. However, I used the transistorized type instead of the tube type. Also one with built in amplifier. Blonder Tongue has them. Now we have a fixed I.F. instead of a variable I.F. from now on. We left the 470-890 with 420 mhz. coverage, and arrived at a 75 or so mhz. I.F.

Now I used Bob Cooper's schematic for I.F. amp, limiter, discriminator, video amp, and AM oscillator to channel 10. Don't use low channels that your incoming I.F. is on. Channel 3-4-5 etc. For the oddball sound maybe sidetune regular ham receiver on 5.2, 6.2, 6.8 mhz. etc. or whatever required to get started.

RF amplifiers at 12 gig may be a problem unless you are a millionaire. The Japs use 2 stages and 2' parabolic. Maybe my 6' parabolic will overcome the absence of the RF amps.

Just thought all this information may be of interest to you. Let me know if any one thing is of particular interest.

-- Paul F. Magee, W3AED



Damper (oscillator injection control) may be necessary with fairly hi-powered gunn osc.

(be sure to ground shield to mixer when removing 1N23 diodes or they will blow from room static)

Damper can be resistor card or even a piece of brass set at center of widest side of waveguide. Must be shielded totally with only a #14 wire sticking out for adjustment. Goes in and out of waveguide. Keep mixer current under 1 mill.

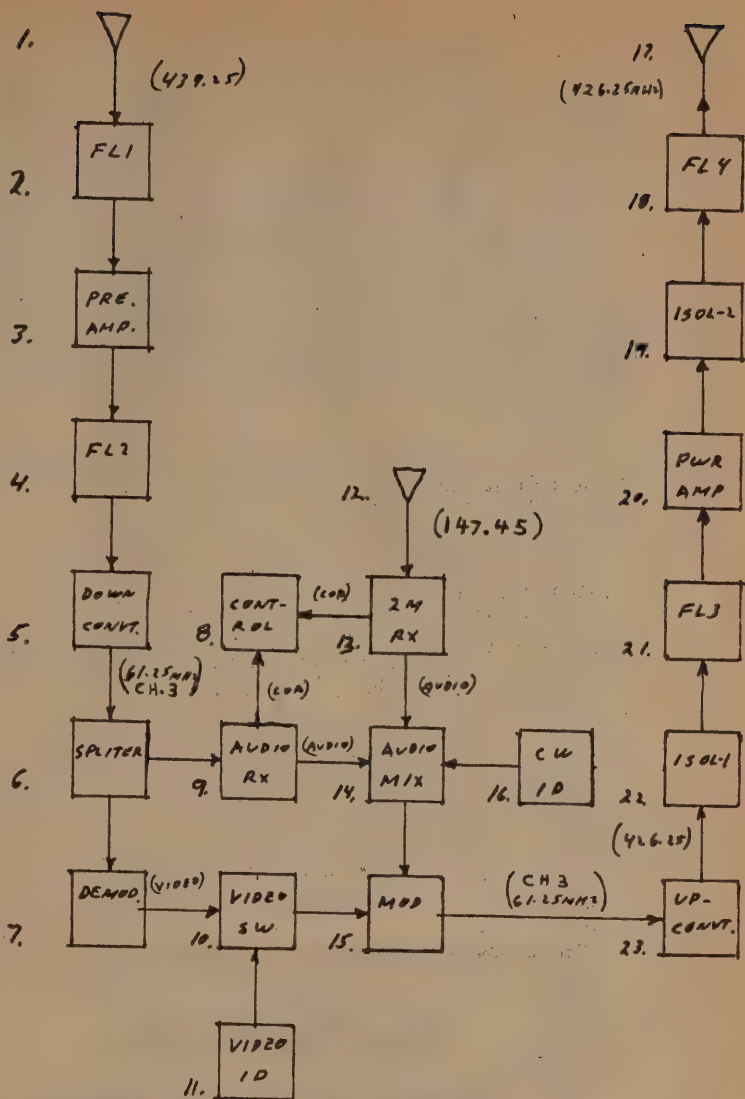
However, the 5000 ohm pot circuit does a good job of controlling mixer current. I prefer it to the damper. Also protects the diode when removing cable. Also allows adjustment of current for best noise level.

**SEND YOUR NEWS
& ARTICLES TO A5
TODAY!**

The DARA ATV repeater is an "in band" UHF repeater with vestigial sideband, commercial quality output. The repeater has full color capability. It was put into operation on April 20, 1979. At that time there were six stations capable of using it. Now, one year later, there are 18 stations sending video into it, and another 15 using the VHF input and receiving the TV output.

The input frequency is 439.25 mHz, A5 Video & F3 Audio. The output frequencies are at 426.25 mHz A5 video, vestigial sideband and audio at 430.75mHz F3 with 25 kHz peak deviation. Also, there is a secondary two meter input for audio only at 147.45 mHz. We have found the two meter input very good for those who can receive, but not yet transmit video, and also for testing equipment.

The repeater committee started with five members, dropped to two, and presently has four members. They are: Stephen Stith, WA8MCH, Chairman; Bruce A. Jaquish, WB8UGV, Asst. Chairman; Randy L. Midkiff, WB8ART; Leo J. Schaaf, WA8ZHE. Thirteen other club members helped on the repeater equipment or its building construction. They are: Howard T. Terry, WB8KGQ; William A. Kalb, WD8DRR; Melvin L. Levy, WA8YKV; Daniel W. Puckett, WD8AAU; Roger A. Kaywood, K8ELN; Samuel F. Warnock, K8NLM; Jeffrey C. McCarroll, WD8MDP; James S. Bennett, N8ADK; Winfred E. Patterson, W8AES; Wynn Rollert, W6CDR; James A. Bacher, WB8VSU; William G. Ingling, W8SVI; Gary D. Magee, N8ADG.



- 11

BY Loo F. Lirpa - 0F9BK

From time to time A5 is privileged to review a new product and has been willing to pass this information along to readers. This issue we are reviewing a General Electric audio recorder, model 51. General specifications. Full track, two speed, reel to reel. Reel size, 3" inside hub, 3.75" outside hub (diameters). Play speeds (two) 200 and 400 RPM. Magnetic material, stainless steel, 4mm wire. Record-play heads. one. Erase, 24-30 kHz oscillator (AC). Tubes, five including rectifier.

Audio response, none given, except it is noted that fidelity will be higher at the faster speed. Recording time, 33 or 66 minutes per reel depending on speed chosen.

In the A5 labs, using a Potamatic Instrument AA-51 and AG-51 audio analyzer test set, the following audio response specifications were measured. Since no alignment tape was supplied to separately evaluate play and record functions, the response is a combined play-record function. Frequency response 80-8000 flat at plus 15 DBM output. -3 DB points 11 kHz and 75 Hz. Noise and hum -33 DB. Erase depth, 20 DB. Distortion of 400 Hz test tone recorded at 1/2 lit neon record indicator, 1.7%. An input level producing maximum output before clipping, 1.5%. Program level to noise ratio 25 DB. Input level -50 DBM microphone (50K ohm unbalanced) -26 DBM line (1 Meg ohm unbalanced). Output +15 DBM at 8 Ohms unbalanced. Fast forward and rewind times, same as play.

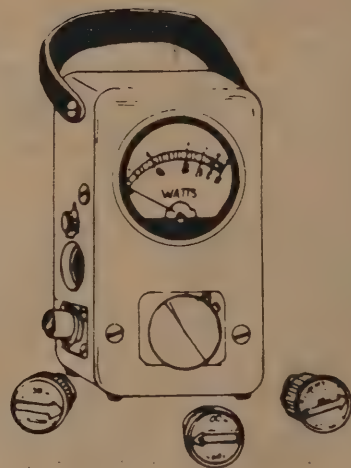
NOTES: This unit has been modified for modern stainless wire. Originally equipped with a Shure Bros. head for carbon steel, the factory modification uses a modern Shure model 812 Wire Recording head. The instructions indicate that, "Since it is becoming very difficult to obtain the old type of recording wire it was decided to redesign the recording and erasing circuit to use stainless steel wire which is obtainable almost anywhere."

We tried several Radio Shack stores, Newark Electronics and Allied Electronics, and none had 4 mm stainless steel recording wire, so we doubt the validity of the claim made by the manufacturer that the recording wire is available almost everywhere.

The recording supplied with the machine was of a voice broadcast of a UN debate in the Security Council with the USSR representative and USA representative speaking with some narrative. Since there was no music, it was not possible to determine the unit's fidelity for music, but the voices were highly intelligible and there was no annoying hiss. Wow and flutter was .8% mid-reel, and speed depends on spool length and position.

A5 rates the unit a good buy; however, the purchaser should be cautioned that the recording wire is not readily available, at least not in Chicago. Perhaps as the devices become more popular the recording material will be more easily located. No mechanical or electrical faults were found during the tests; however, the recording wire did break once near the end of the reel where it had been held in place with cellophane tape. Care should be exercised when approaching the end of a reel to avoid this difficulty. A gear driven clock mechanism also provides direct readout of record/play time, and a third hand provides an automatic shut-off of the mechanism at a pre-selected time to provide automatic operation.

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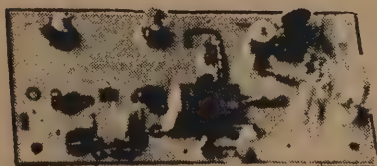
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Puts audio on with your camera video just as broadcast TV does at 4.5 mHz. Puts out up to 1 v p-p to drive the TXA5 or VM-2, 3, or 4 modulators. Requires low Z mic (150 to 600 ohms), and +12 to 18 vdc @ 25 ma. Works with any xmtr with 5 mHz video bandwidth.



4. TVC-2 ATV DOWNCONVERTER \$55 ppd

Stripline MRF901 (1.7 db NF) preamp and double balanced mixer module digs out the weak ones but resists intermods and overload. Connects between uhf antenna and TV set tuned to channel 2 or 3. Varicap tunes 420 to 450 mHz. Requires +12 to 18 vdc @ 20 ma.

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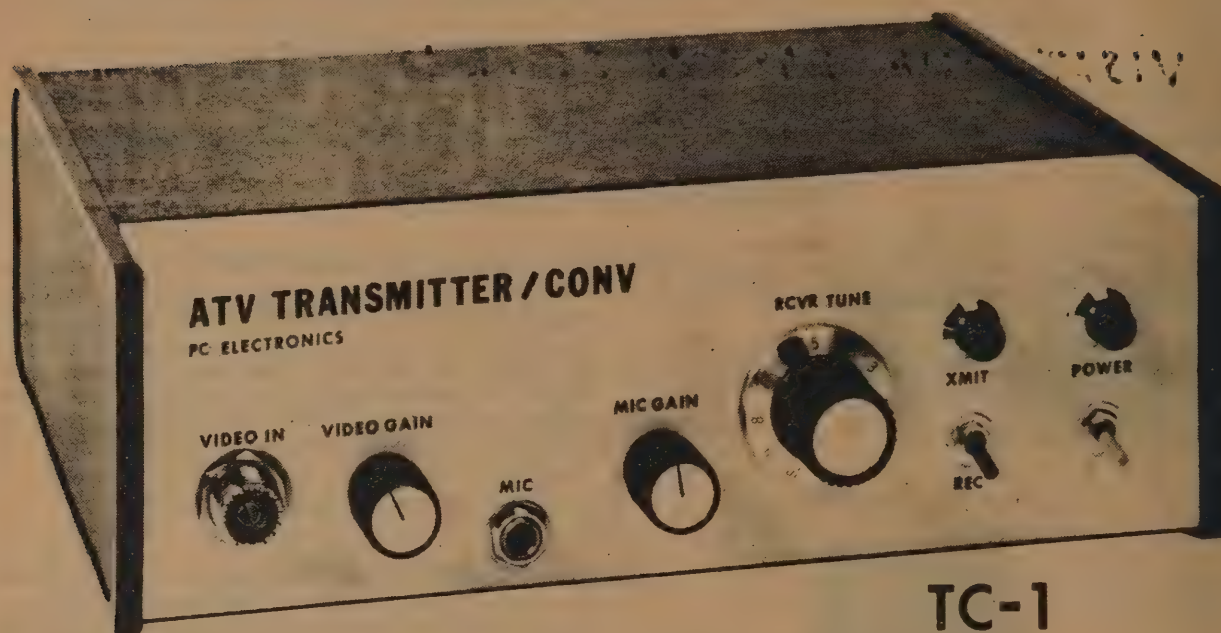
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TOM W6ORG
MARYANN WB6YSS
213/ 447-4565

HI DESERT ATV NEWS: New ATV'er, N4ASC, Peter is now receiving on 434 MHz in Lancaster. Fred, WB6RSM, worked Larry, K6MOZ snow free from Lancaster to Big Bear. Fred's picture was also seen 60% snow on Mt. Wilson. Be looking for some Activity from Victorville and Ridgecrest soon. Yours truly is keeping the ATV airwaves warm from Quartz Hill, see you next year.

HIGH DESERT ATV NEWS: It looks like the "skip" is in to Quartz Hill. Picture received from WA6SVT, 90% snow, from W6QDP, sync bars. The 7289 amp is finished and I'm "blowing smoke" with 35 to 40 watts average video from Quartz Hill. Fred, WB6RSM, is getting back on with a %44 final amp and also George, K6GZG, is almost finished with his 4 bay Yagi for ATV. Everybody in LA and Orange County, point your "rabbit ears" to the High Desert.
-- Doug, K6KMN

ORANGE COUNTY ATV: Orange Co. has two new ATV stations: KA6EXQ, Otis and his XYL, Joyce, KA6IID, located in La Habra. Welcome guys, your pictures are super into Westminster... K6TEE, Larry, in Whittier, is coming along fine with his ATV station. His new homebrew antenna is working good, now he is working on his transmitting! Good luck Larry. We have been looking for W6YBI, Hugh, every night, hope to see his picture brighten up the TV screen soon.

Lee, WA6ZMI

WEST L.A.: Echoes of most other areas, is the shoulder to shoulder effort to get on 1200; with W6RVP amongst our most active 24 hour regional ATV assistance monitors and gear toting travelers. It's been "musical" 1200 equipment, because upon seeing the Mt. Wilson Repeater and/or Johnstone video repeaters from ones own QTH, the adrenalin to get on that band really flows! The Mt. Wilson repeater, with its new antenna and power amp has recently achieved 1200 transmit capabilities. Prez. Bill happily reports that by using WA6SVT's hookup of the SS-1 and VA-2, his transmitter power and video quality have at least doubled. Norm, WA6VQJ, and Steve, W6SFI, are rumored to be on the brink of watching the repeater's outputs! REQUEST FROM WB6ZPN:

"Dear Diane: Prez Bill and I have reviewed the West Side L.A. Representative Position; and my thoughts to him and everyone also, is that John, W6RVP, has been doing an outstanding representation in the last year, and he is planning to continue for some time to come. Between my work at the Braille Institute, and school nights and weekends, it is to the best interest of the Club that I recommend John, W6RVP, to take over as West Side Rep. He monitors morning, noon, and night, 7 days a week and invites everyone over to his place for technical assistance; and often rides the RTD bus great distances with ATV gear under each arm; and since he is willing and able to handle this position, I hope you and the other Cluu Officers endorse this proposed change."

-- John, WB6ZPN

SAN DIEGO NEWS: Only 2 at our ATV Breakfast on the 15th, but Jay, N6BDT, and myself, WA6JCG, got a lot done. I was asked to put on a program for the Sandra Group on ATV. I got the gang here to help and it was a good show. Frederick, WA6AXO, and his XYL, Terry, AL7AE, transmitted on 434 and we got a fine pix. Jay, N6BDT, brought his 1296 trans. and receiver and gave a real fine demo on how a Coffee Can works. The people were amazed to see the fine pix. I brought the antenna, pole, coax, TV, trans., rec., camera, tripod, and gel batteries, and everything worked fine. Jack, WA6AXW, worked the camera and helped set things up. We must have done a good job as we were told on the QT we could put our Repeater in the new Site. Sandra is building on Otey Mountain. Got some new ATV'ers: W6ZUM, Bill. Got a 2300 MHz receiver and dish. And, W6OBB, Art, has a new antenna.

-- Bob, WA6JCG

EAST L.A. NEWS: Larry, K6TEE, has his transmitter working with a new 5894 tube that Lee, WA6ZMI, gave him. Larry is in East Whittier, so look for his picture; keep up the good work, Larry. Dave, W6QDP, assisted Bill, K6SBV, in getting his ATV rig back in tip top shape. Looking good, Bill. Larry, K6MOZ, is up in the mountains near Green Valley Lake, and has made contacts on the desert side and coast side of the mountains. Mike, WA6SVT, has rebuilt his ATV transmitter/converter, the transmitter has 426 and 434. The down converters for 450 and 1200 bands built in.

-- Mike, WA6SVT

STANDARDS

Ohm-Unit of resistance of a column of mercury at 0°C having a uniform cross section of one sq. centimeter and a length of 106.30 centimeters (R).
Ampere $1A = 6.24 \times 10^{18}$ electron/sec- unit of current (I) one ampere which when passed through a silver nitrate solution causes silver to be deposited at the rate of .001118 of a gram per second.

Volt-Unit of EMF (E) which causes one ampere to flow through one ohm when steadily applied across circuit.

Farad- Unit of Capacitance (C) of a condenser in which a potential difference of one volt causes the condenser to have a charge of one coulomb of electricity.

Coulomb ($1C = 6.24 \times 10^{18}$ electrons)-that quantity of electricity transferred by a current of one ampere in one second.

Henry-the inductance (one henry) in a circuit in which the EMF is one volt and the inducting current varies at the rate of one ampere per second.

Watt-the power (one watt) expended by a current of one ampere flowing through a resistance of one ohm. Also = to 3.413 BTU.

Joule-energy (one Joule) expended in one second by the flow of one ampere through one ohm res.

FREQUENCY COORDINATION W6ORG

SCRRBA Meeting: I presented a new 1200-MHz Band Plan to the Technical Committee that would give us 5 channels beginning at 1241 MHz, spaced 12 MHz (same as broadcast), yet left almost 20 MHz for FM mode, and 2 MHz for weak signal, and 4 MHz for satellite. It was well received and a meeting with other mode users will be held sometime during the First Quarter of next year. The basic 12 MHz segment is outlined below. The video carrier freq's are: 1241 Simplex and duplex with 434 or 426.25, 1253, 1265, 1277 for Repeater outputs, and 1289 for links. We expect to lose 1215 to 1240 in about 3 years so that end is being left open. 12 MHz spacing will keep the LSB interference well down. The actual freq. assignments are flexible, but the lower freq. are the easiest ones to filter the 3rd harmonic for duplex or Repeater operation. Much consideration was given to 1277 instead of 1241, but 1241 will remain Simplex as the original idea for this freq. was to allow full duplex operation with 434 and there are and have been more people there. However, 1277 will not be assigned until the others are filled.

Mike, WA6SVT, has asked for 1253 if the new band plan is approved, but will operate on 1241 until that time. AMSAT has said that they are building a satellite with a 1260 freq. I'm trying to get them to fill the 1260 and 1270 segment from the bottom up rather than arbitrarily plopping down in the middle. It does mean that I'll have to go to a separate sound xmtr to eliminate the LSB sound subcarrier. One point I'm making to them is to leave 1265 for a future ATV satellite input. SCRRBA did ask how many were using the 426.25 freq., as there were no reported interference reports. By the way, we appreciate those who used 426.25 during the week we used 434 continuously for Voyager. AMSAT hopes to try again to put up a 435 bird (input) sometime in 1982, but is having a hard time getting definite space on a vehicle. ARRL says that Ham Radio is not now looked upon as being a hobby that comes up with technical innovations and therefore diminishes our strength at keeping our frequencies. However, Public Service activity does count a lot!! So we can help by participating in more events and making sure they get publicized - Rose Parade, Congressional Cup Yacht Race, Operation Santa Claus, natural disasters, marathon races, etc., GET INVOLVED. HIRAN is trying again to get into our 420 and 450 band. They are in Alaska and the Southern Gulf. The signal is a transponder used to locate oil derricks accurately. The League is fighting it. The interference we have been experiencing lately is radar jamming by our own Navy for experimenting with countermeasures. But the signal signature varies. Let me know time and bearing of your observations. Aviation charts are very handy to check bearing and distance to stations you work, and to see how high obstacles are. Los Angeles Sectional charts are available for about \$2 each at most all airports that have aircraft rentals and instruction.

BEYOND THE POND NEWS

The latest issue of A5 arrived last week and it prompted me to drop you a brief line to say how much the magazine is appreciated by us. I say us because any interesting articles get circulated around the local ATV fraternity. In particular the articles by Tom W6ORG on repeater techniques cause a lot of interest though whether we can ever get anything similar up is doubtful because of the high cost compared with the small number of really dedicated ATVers. We have a lot of fun on simplex 70 cm. anyway, so perhaps we can manage without a repeater for the time being.

I do like the format of the mag. in particular the satellite article reprints are most informative. Admittedly we don't have the same reception possibilities over here but there's no harm in dreaming.... You seem to include rather a lot of slowscan, which doesn't really excite me, but I can't help it if other people find it interesting!

As you may know, I am UK agent for PC Electronics and you might give Tom an unsolicited plug in your columns. I think it is nine G-stations now use his 10 watt solid state tv tx combination. The device is really unsurpassed for simplicity and reliability, and although it is relatively more expensive in this part of the world everyone who has bought one considers it extremely good value. Using it together with the British made EDL linear you get a very clean and powerful signal, and it really is as linear as Tom claims.

The station here at G8PTH is being completely rebuilt, vaguely on more professional lines. Everything is going into 10" subracks and the SPG is to be 625/525 line switchable. I have recently acquired a triple standard (PAL-SECAM-NTSC) VHS video recorder, which is very exciting the only thing is that I have no NTSC tapes to play on it! So I wonder if you could give me a mention in your magazine and say that I will be happy to exchange ATV tapes on NTSC VHS format (2 hours standard). By the time it gets into print I should have the dual standard SPG going but origination here will only be in black and white, unless any of your readers can decode PAL color on a 525 line standard!

While I'm on the subject of requests, can you tell me if you can still get hold of monoscope tubes in the States? I know they are old hat but I am fascinated by them. I have now got two old monoscope cameras (both all valve jobs, none of your new fangled crystal triodes) and I would very much like to get hold of at least one IIS monoscope tube, say the Indian Head pattern and any others with station I/Ds. I am hoping that

later on this year I shall make it to the States for a brief holiday, if not there are still other 'amateur' ways of getting a tube across the water. Anyway if you can publish my request now I can at least get these things arranged in advance.

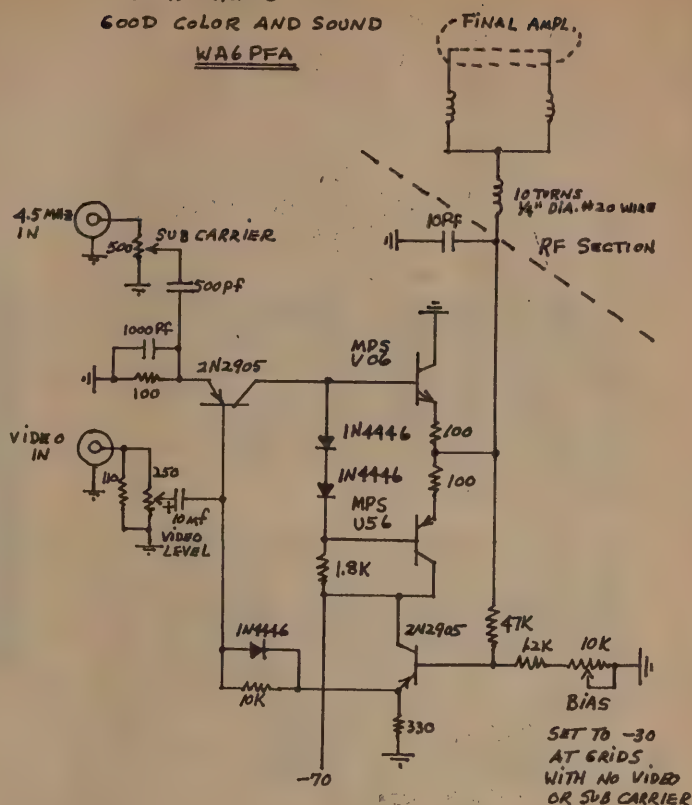
Now you did say in the magazine that you were thinking about reprinting the ATV IN A NUTSHELL book and asked for opinions. Well, here are mine. Most of the material is well worth reprinting even though some is beginning to get a little out of date. I guess the trouble is finding someone to write newer material. The operators guide does seem to take up a lot of space and the non-USA listings are so incomplete that I wonder if they are worth putting in. The antenna article is fascinating - I very nearly constructed this design just to see if you really did get the gain the author claimed. It looked a bit generous to me, but perhaps he meant isotropic gain rather than referenced to a dipole. That would account for the difference. Unfortunately the diagrams are a bit rosey and some dimensions are not given or else they conflict. I'm saying this from memory, though, which isn't really fair, so I can't say exactly what was missing in the article. What little I know about antenna theory tells me that a) dimensions of broadside colinears are not really critical as they are wideband devices, but b) if you do want those last 2 dB out of an aerial little things like element spacings and diameters do count then. Can you perhaps reprint your review of commercial equipment from A5? Possibly add a bit more because the newcomer wants some reassurance before he spends lots of money on gear. How about something too on modern one chip SPG designs and something on color synthesis. The Apton book is weak on this. And how about some IC test patterns and mention the National Semiconductor test generator IC used in the Heathkit device. I'm enclosing a couple of things I wrote for our British Amateur Television Club, which you might be able to reprint with any necessary alteration. Oh yes, and how about reprinting all Tom's W6ORG's hand-outs in one set, assuming he agrees. His basic station guide is very fine, in fact it inspired my "Appliance Operator's Guide" (joke). Well, that's about all the news from this QTH. Hope it finds you as it leaves me.

-- Andy, G8PTH, Canterbury, England

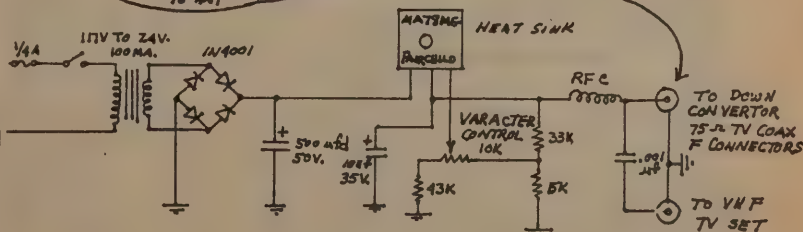
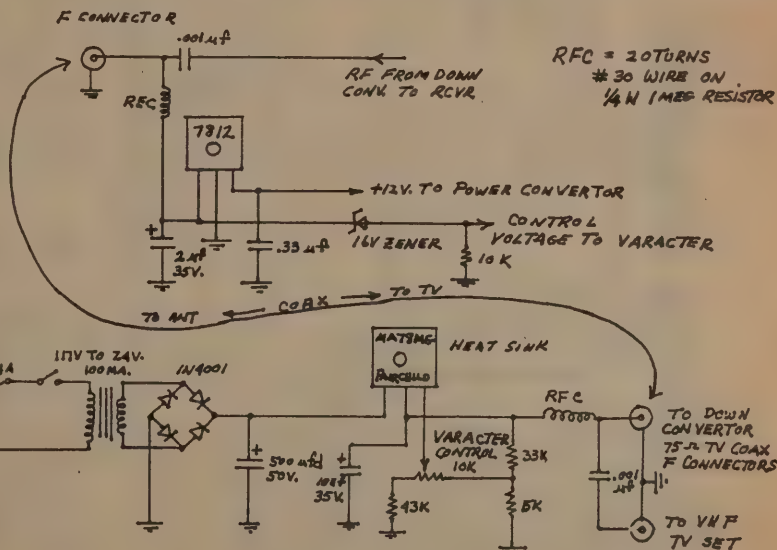
News from VE2 Land...Quebec City area is now active on FSTV. Few operators are now sending and receiving Bk/White pictures at 439.25 MHz. (Sound is on 2 meters for now) A new video committee will be formed this fall at the local club VE2RCQ to encourage this aspect of our hobby. Possibility of putting up a repeater will be discussed this winter. Thanks to VE2BFA, VE2DPU, VE2BOX, VE2YO, VE2FTR, VE2BRN. New members will join shortly.

-- Giles Chenette, Loretteville, Quebec

MODULATOR FOR CMU-15 OR OTHER TUBE TYPE ATV XMITTERS GOOD COLOR AND SOUND WA6PFA



ELIMINATE CONTROL LINE TO DOWN CONVERTOR

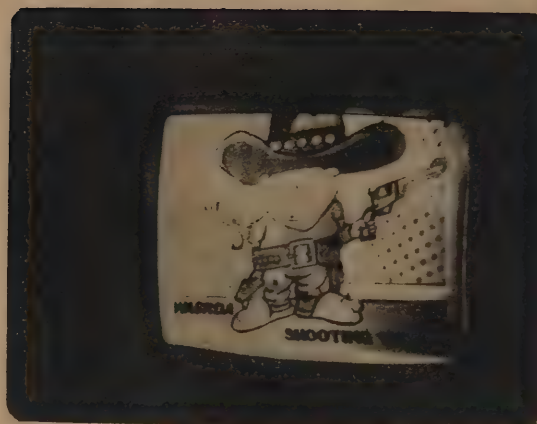


WA6PFA

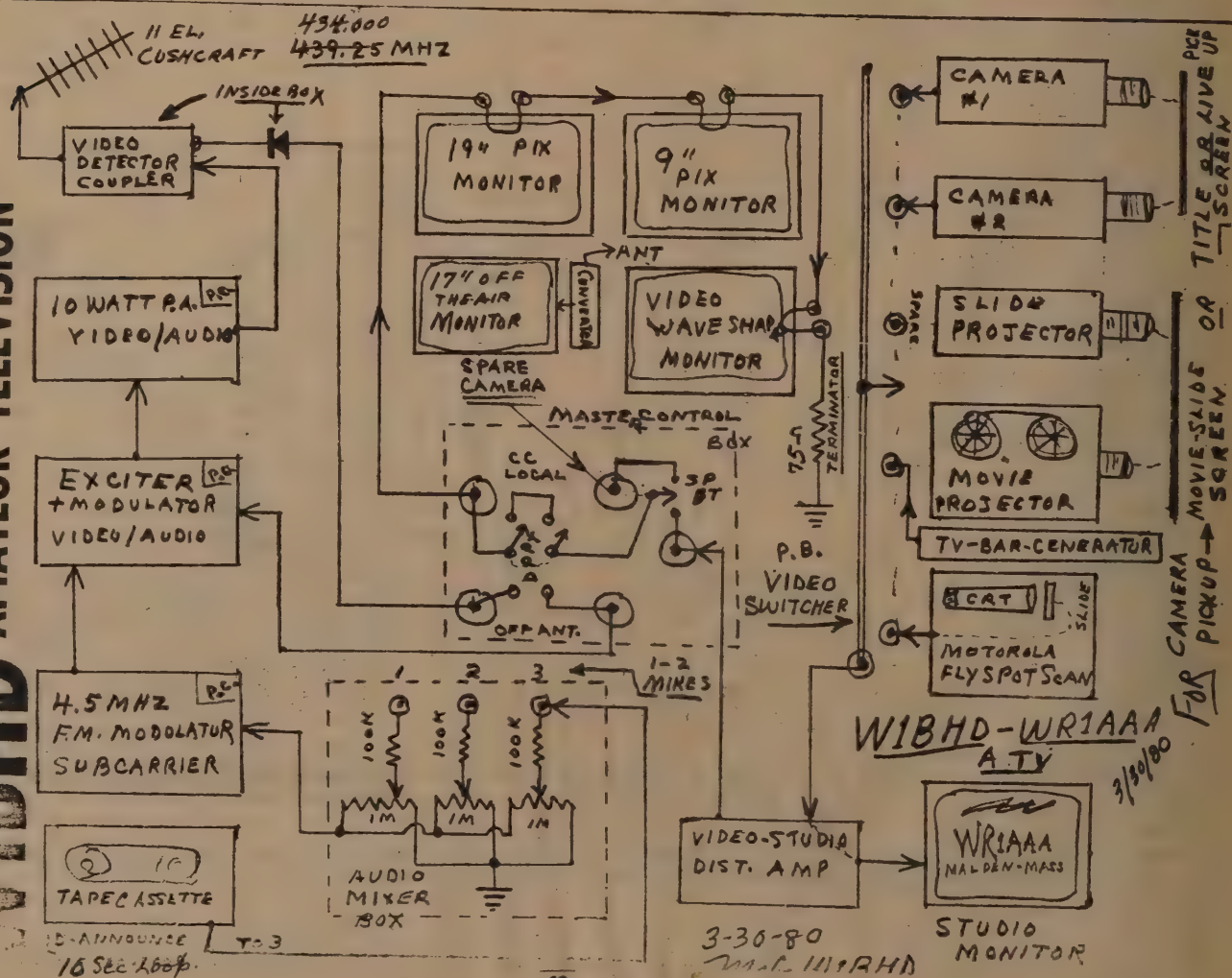
BACK ISSUES: Sept 79, March 80, May 80, July 80, Sept 80, Nov 80, Jan 81. \$2 each post paid or all for \$10 quantities limited ORDER TODAY. A5 - 7391 W. Hwy. 46, Ellettsville, IN 47429.

Just want to say that your FB magazine does a fine job in keeping every interested party up to date with the AS world. Tony's K1VTE ATV repeater is back on the air again and doing fine. Frequency was changed to 434.000 input and 422.75 output. Change was made due to a large radar on 440 mhz located a few miles north of here. The first "Bible" ATV in a nut shell was very good and I am sure the next one will be a big winner.

Not very revolutionary, but the enclosed print is a simple one and does all the good things with a minimum of switching. The SPDT gives any two inputs of video from cameras or whatever, and the DPDP gives closed circuit to monitors, in the other position puts the video diode to feed the monitor. -- Mel WIBHD, Massachusetts



WIBHD AMATEUR TELEVISION



BEAT THE HIGH PRICES WITH THIS

HOME BREW 60' METAL TOWER

BY G. Wilson, WA6RDA

Problem: You need a tower to support all those antennas, but just can't scrape up enough bucks to buy one?

Answer: Build this one for less than \$1.70 per foot. That's a 60' tower for under \$100!

This tower was constructed in only 3 week-ends, and erected with only the use of a winch and a come-along. This was done only by myself without the help of anyone else.

Notice that the entire tower is bolted together for assembly except the rotor bushing. Although the tower shown here is two 30' mast sections, the cost would be about the same for three twenty foot masts. The advantage of two 30' masts is its simplicity and strength, plus you only lose 3' overall lap. Material used is electrical thin wall conduit (EMT) for all bracing on all size masts. Cut all braces carefully the same length, then flatten both ends with a vise or hammer. Flatten ends so that the welded seam is in the center and not to the edge or it may split. Flatten $1\frac{1}{2}$ to $1\frac{1}{2}$ " back, then drill $\frac{1}{2}$ " hole at each end. Bend ends approximately as shown. Vertical tubes on inner mast are $\frac{3}{4}$ " EMT, and for outer mast 1" is used. To build one 10' section, you will need the following:

$\frac{3}{4}$ " EMT	3pcs	24 nuts and bolts $\frac{1}{4}$ - 20 x 2"
$\frac{1}{2}$ " EMT	4pcs	All EMT comes in 10' sections

How professional your tower will look depends on your care and accuracy, so a drill press is preferred. I did mine with a hand drill and careful measuring. All ladder braces are cut and installed last. Make the first one by trial and error and then copy it. Install ladder braces on one side only. Drill 4 holes in each vertical tube, all in a straight row, using the welded seam for a straight edge. The remaining three holes, which are 120 degrees off should be drilled later after assembly. Each 10' section is pre-assembled in three separate parts, then joined together inside a jig for final drilling and bolting. The secret to easy assembly is to make two jigs from plywood 2'x2' sheets. Cut a triangle out in the middle, and slip the outer pieces on each end. Each section is pre-assembled in three main parts, all being exactly alike. Assemble using C clamps inside the jig, then drill remaining holes and bolt. Use lockwashers or lock-tite on all nuts.



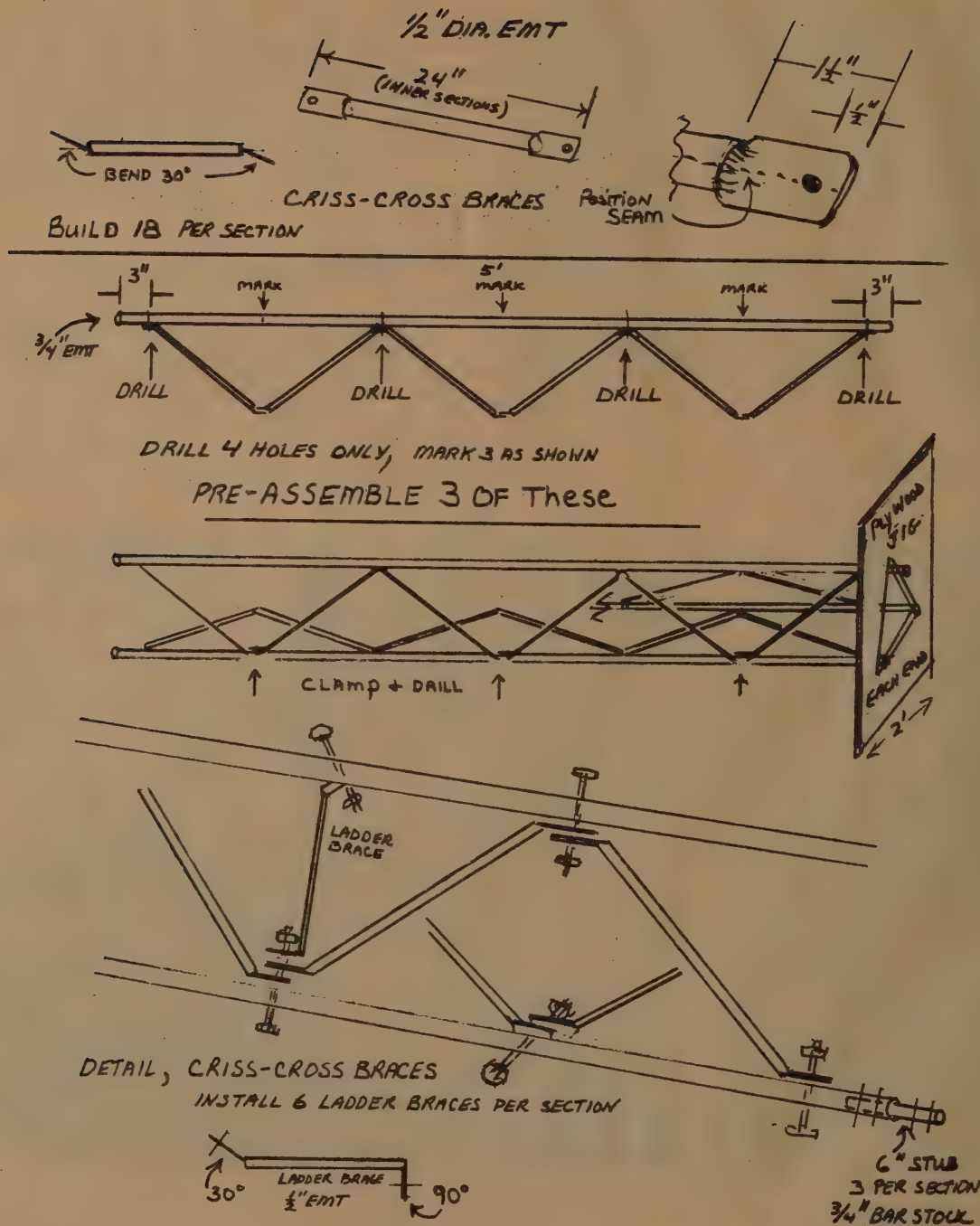
Homebrew tower supporting ATV
Quagi, 2m stacks, tri-band.



Construction detail.



60' Homebrew tower.



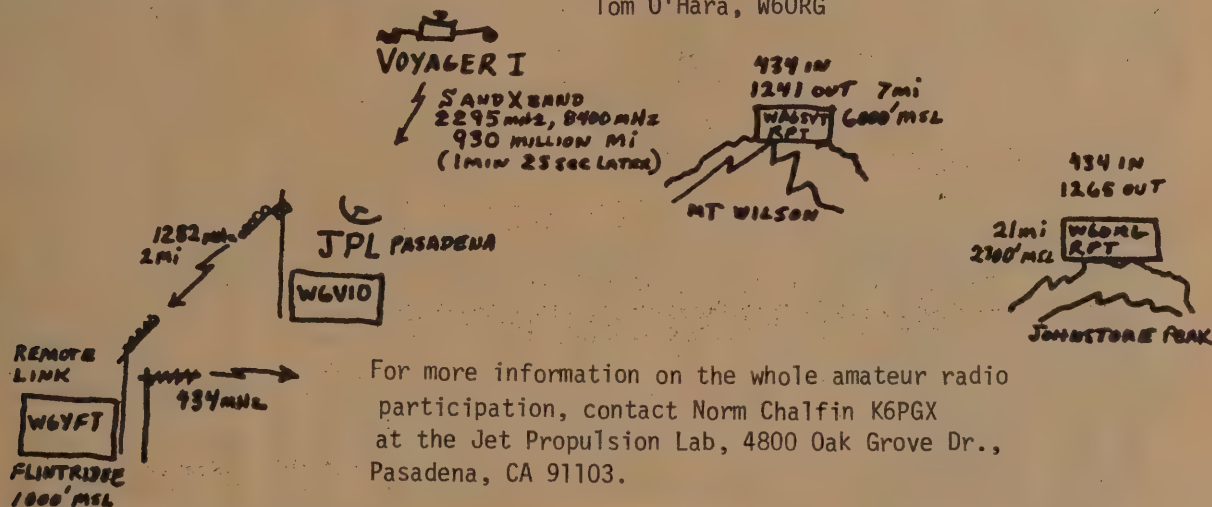
WA6 RDA

FAST SCAN ATV COVERAGE OF THE VOYAGER 1 CLOSE ENCOUNTER WITH SATURN

The JPL ham club has added Fast Scan video along with its slowscan video. The system is sketched below. The link from JPL (1282 MHz) to a hill 2 miles away at W6YFT was designed and built by Tom O'Hara W6ORG of P.C. Electronics. JPL is back in a valley which does not have a good path to either of the two ATV repeaters or direct simplex on 434 MHz. So a link was needed to retransmit the Saturn Voyager 1 video on 434 MHz from a good location that could get both repeaters. Dale W6YFT in Flintridge volunteered to have a 1282 to 434 MHz video repeater placed at his QTH for the event. He is located about 2 miles from JPL. Spectrum International loaned W6ORG two loop Yagis and a 1282 MHz downconverter for the event. The 1282 MHz transmitter is mounted right at the loop Yagi to save any coax loss to its 5 watts. The crossband repeater was made from the SI downconverter into a portable TV set. The TV was modified to have a 1 volt video output, Audio output, and a AGC controlled relay for keying the P.C. Electronics TC-1 434 MHz 10 watt transmitter.

The system came on around 1:00 PM Monday November 10 and was seen by many members of the So. Calif. ATV club: Diane WA6MVD in Sunnymead (50 mi), Lee WA6ZMI Westminster (40 mi), John W6RVP Los Angeles (35 mi), and Dave W6QDP (15 mi) in Pico Rivera. Picture quality was very good on both repeaters and on 434 MHz. The microphone picked up all the conversations going on inside the ham club's shack and put it out on the sound subcarrier. Operators at JPL's club station W6V10 switched between the incoming pictures from Voyager 1 as they were received, a camera for showing photographs of Saturn previously sent, and a second camera used to show them at their operating positions on HF SSB and slowscan. It's estimated that by the end of the week most all of the So. Calif. ATV Club's 108 members will have been able to see the direct pictures of this historic event. Much of the activity and pictures will be available on VHS video tape later.

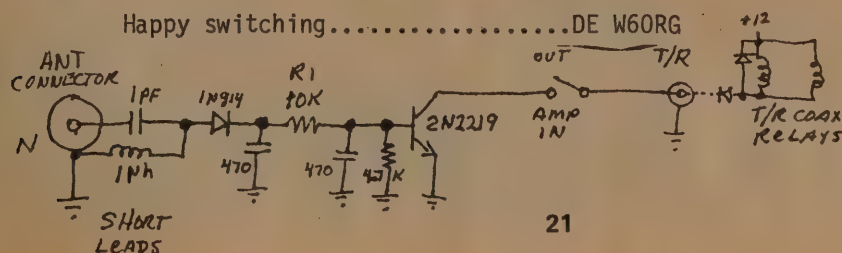
Tom O'Hara, W6ORG



AUTOMATIC KEYING FOR THE EDL432P 60 WATT 432 LINEAR

It's not always convenient to ground the T/R jack on the back of the EDL432P when you want to kick in the afterburner with the TC-1 ATV Transmitter converter. Many 2 meter FM transistor "linears" detect presence of RF and key the amp into the transmit condition.

A few parts is all that is necessary to add the RF sensing key to the EDL432P. The parts are mounted next to the antenna output connector and a lead from the transistor collector is run up to an added front panel spdt switch. Another lead from the other side of the switch is run to the center of the T/R RCA jack. The switch allows automatic T/R switching when 3 or more watts of RF is present at the input, or with the switch off, straight thru (barefoot) operation. This same circuit can be applied to any other amp up to 100 watts. For higher power amps, use diodes with a higher reverse breakdown voltage and a higher value of series base resistor R1, and/or a pickup wire instead of the 1pf.



Sharp readers will note that there was no attempt to transmit how saturated the color is (vector amplitude on NTSC). The system uses a luminance-chroma (four way matrix) to determine color amplitude. There are several ways to add the additional information, but the idea was to send as simple a signal as possible.

Bandwidth of the receiver will affect the length of pulse time as recovered. True, but if the receiver is wide enough (about 1.5 Mhz assuming that the total info can be crammed into 1 Mhz, the degradation will be negligible and you can still have 4 channels for the one now. Also there are other systems besides PDM which could be used to define the time element.

The color/luminance info is interchangeable (and was interchanged) since either component of the signal could be sent by either carrier offset or pulse time duration. Which you choose depends on other considerations (frequency interleaving of sidebands). Quadrature modulation multiple carriers, subcarriers, etc could all be used as they are today.

The system is overly complex. Right now, correct. With emerging technology, the system becomes easier to accomplish. The system was developed to save spectrum, not receiver costs. Since the system is no longer tied to live frequency (or 59.94/15,734) for scanning standards, you can develop any level of resolution you desire, from 28 x 28 bits to 2,000 lines and 2,000 pixels per line. There is also no need to retain the 3:4 aspect ratio, you could have wide screen TV as there are wide screen movies with 3:7 ratios if you like.

Interlace scanning is no longer necessary since there is no flicker in the image.

Interlace scanning (or transmission) could be used to send more than one picture on the same carrier on a time share basis. The signals would not have to be scan compatible either since the storage system provides a scan conversion to accept any input you desire (ie you could interlace a 625/50 and a 525/60 pictures, you would simply select those as the duty cycle for the memory switch, or let the receiver automatically make the correction.

The resolution is not the same as "real TV" True. But we can determine, very precisely how much detail we want, and how much we want to paint in. A texture library can duplicate most objects. The real problem in the working system was the loss of the contour signal when the image did not have sharp details. A contour signal is developed by differentiating the video and returning all spaces to a base level, so you wind up with a bunch of spikes, the amplitude of which vary with the high frequency content of the image contour. By pre-emphasizing and filtering info from only the 4.2 Mhz region, most objects can be outlined (much like a chroma keyer) but there are always some spikes which fall below the trigger level. If you set the level high, you are sure to have edges, but you miss a lot of the softer transitions. If you set it near the base, you get a lot of false edges from noise and highlights. The idea is to set the trigger level just high enough to get the real contour edges and miss the other stuff. Not easy unless you pre-condition the signal and provide some additional "intelligence", or have a super quiet amplifier (mine was 64db s/n) One thought is to use a highlight rejection circuit where the luminance level would be used to trigger a NOT CONTOUR signal so that highlights would be ignored by the contour trigger. A real problem exists when you use a crummy signal, ie from a U-matic machine, which has a rotten (at best 43 db) s/n ratio, which is visually trash by the time its been edited and dubbed twice. You could also use an RMS noise detector, and adjust the trigger level by reference to the RMS noise level say noise plus 6 units.

Instant cartoons? Any object, by removing the shading contours becomes a very flat two dimensional picture and you can get instant cartoons using this method. The textures and soft contours all fall out in the processing and your people begin to look like Saturday morning kiddie shows, only better animated.

The system is really put together from bits and pieces of several other systems. The idea was to get folks thinking, questioning, rejecting the common place. Don't take for granted any given circumstance or system. Develop new ideas new ways, no matter how unorthodox, complicated weird, strange or silly. You will, given enough time, develop something useful. Forty years ago not many folks thought that the majority of the population would sit at home just to watch TV, after-all there were movies, radio dramas, live stage entertainment, movie serials (remember the Perils of Pauline, Flash Gordon, Tarzan and other serials? How about Radar Rangers!) fun parks (roller coasters) Coney Island, Riverview, Walled Lake, Oceanside Park. Now its Magic Mountain, Six Flags Cedar Point, and \$5 to see a movie. When I was a kid it was 50c for a double feature on Saturday and popcorn was 25c, 30c with extra butter! Now you get one feature, no cartoons, and a lot of "comming attractions" for \$5 (and up)! Even the X rated shows (there is an outdoor X movie about a mile from the house) advertise only three shows (used to be four). If I'd have been smart I would have bought the house next door to the movie and put a camera and shotgun mic on the roof! I live on the wrong side and there's a hill in the way too!

New use for SSTV. Trying to read a meter in a remote location? Only have a pair of wires? Tried and tried to get the right phasor tuning on an AM array, but the trips between the tuning house and the TX were getting me down. Finally, used a Robot 80 camera, 1500 feet of 8450 Belden wire and my 400 and watched the meter on the antenna from the comfort of the building as I cranked away on the phasor controls. Got it done in a half hour after three days of struggling!. Put the set-up in the car for field strength checks, and was able to verify the null from the phasor while an untrained assistant shot a pix of the Nems-Clark back over the commercial two-way. Is It Legal Dept? Wonder if it would be legal for a broadcast station to monitor its transmitter readings by SSTV over conventional phone or TSL radio link? Just have the unit pan, snatch,pan snatch, pan, snatch the plate I, plate E and % power meters.



DEVOTED TO HAM TV

NEW ATV (FSTV) & SSTV VIDEOCASSETTE MAILING SERVICE AVAILABLE

Having exchanged a few videocassettes with different ATV groups and clubs, it became apparent that a service was needed to act as a center for the exchange of tapes by all of the different ATV Clubs worldwide. FSTV is a lot of fun, but is limited to local areas and repeater systems. Now you can "see" what is happening out in California or Bloomington, Indiana or New York or Texas. A great demo-tape for programs, exhibits, public service or a means to spruce up that ole' club meeting or to show potential ATV recruits!

I prefer VHS format, but can work BETA as well. Every ATV group or Club is encouraged to send a 2 hour format videocassette showing all the members of your ATV crew, your locations, ATV-mobile operation, Air-mobile fly-bys or just whatever you think might be of interest to others. The tapes will be loaned out on a library basis to the requesting group for a specified period. Reply tapes are encouraged from one group to another. Copies can be made of tapes at no charge by sending a blank videocassette or monetary exchange. Listings of tapes available will be maintained under the FSTV News column in A5 MAGAZINE on a regular basis for selection.

SSTV enthusiasts can operate the same program on audio cassette as well with ARTS stocking such tapes as W6VIO-Voyager in Outer Space programs 1979/80 (Saturn) or the Mt. St. Helens Eruption programs by W7AMQ.

The "service" is here, all ATV groups and Clubs get to work and start filling the "library" with interesting videocassettes!

Send tapes to:

AMATEUR RADIO TELEVISION SERVICE (ARTS)

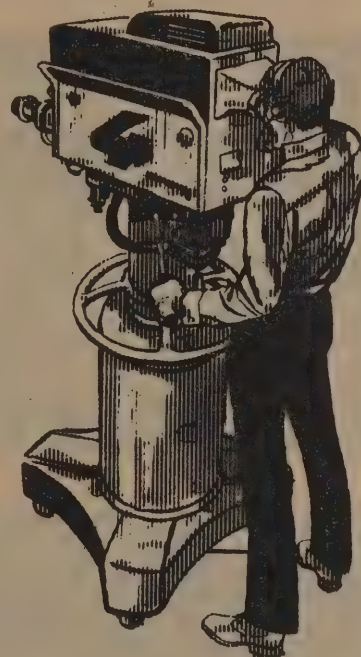
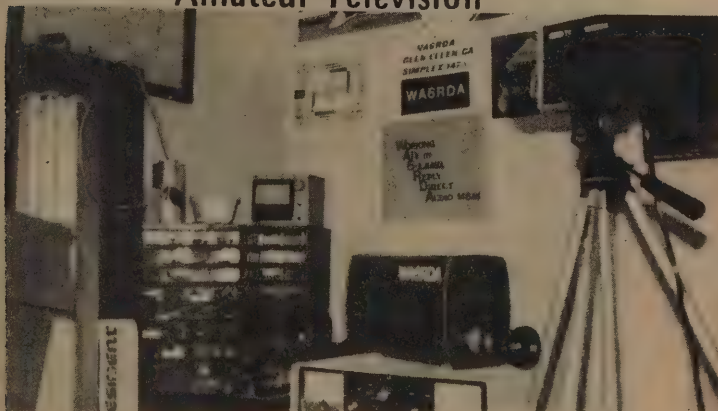
Mike Stone, WBØQCD

P.O. Box H, Lowden, Iowa 52255

(Always send two-way postage compensation)



Amateur Television



GREETINGS FROM SOUTH AFRICA!

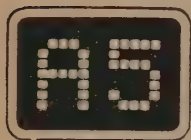
-SSTV-

"SSTV" seems to be most enjoyable for me of all the modes available in Amateur Radio. Pictures from stateside come thru closed-circuit copy except when there is heavy QRM. I am using the German SC422 SSTV Converter and KB422 Keyboard by Volker Wraase DL2RZ. I additionally have two Robot 400's which gives me a 5 memory capability which I am experimenting with in Color SSTV with G3NOX and W7KPW.

I am using a homebrew Quad antenna with about 50 watts RF output. I would like to see more articles on Don Miller's MSTV and Lighting improvement projects.

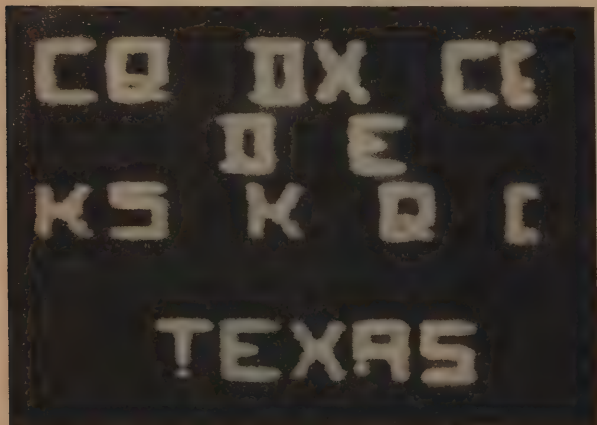


WB3APB "Bill"

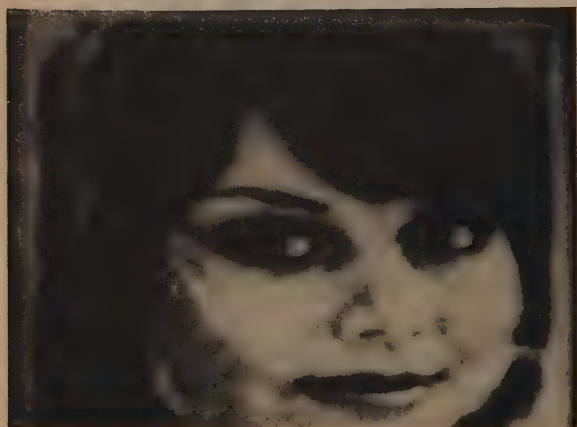


73's
ZS6BQT
"Ernie"
E.O. Hagenaar
PO Box 113
2128 RIVONIA
Rep. South Africa

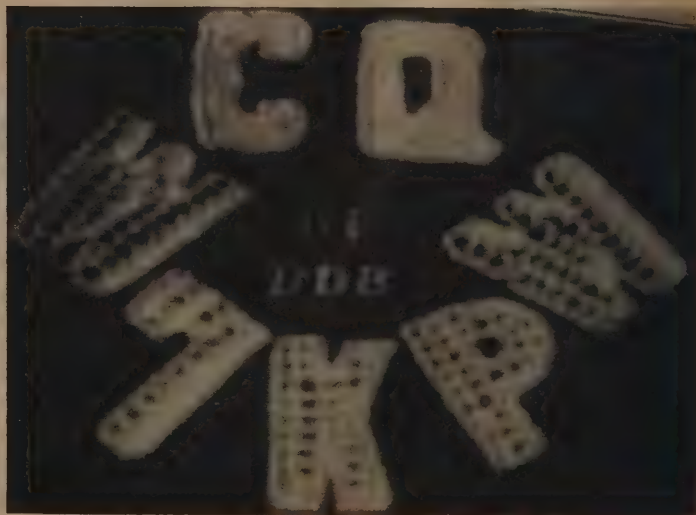
P.S. Keep up the good work Henry on At Magazine We await each issue eagerly!



VK3J2
"Ralph"
Melbourne
Australia



? ? ?



ZS6BQT LX1JAS TR8WR 5NØDOG

Fast Scan TV-SSTV

video

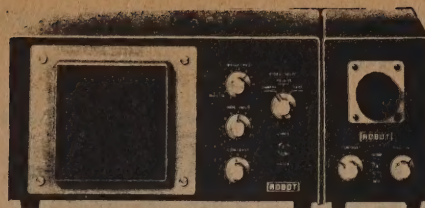
A5

Amateur Television Magazine

Mike Stone, WBØQCD

P.O. Box H, Lowden, Iowa 52255





Amateur Television SLOW SCAN TV

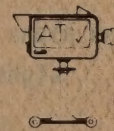
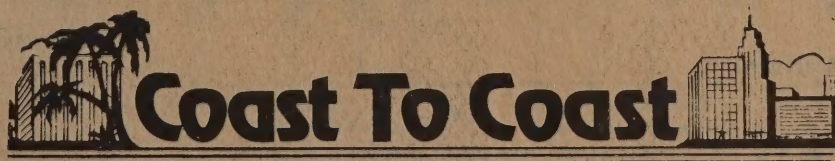
Happy New Year! The fall Dx season on SSTV was better than last year here in the midwest. Everything seemed to come in about two months ahead of schedule with South America noticeably missing in October-December. South Africa is in strong early mornings with northern Europe sending RSV 595 signals by 9099 CDT. ZI2FR Nelson and ZLiBLV Derek have been almost daily at 28.680 mHz as has XS6BTD, BS6BQT and ZS6PP. G3NOX, WA7WOD and ZS6BTD sending COLOR SSTV mostly at secondary frequency of 28.180 mHz (500 kHz bandswitch). KB9FO had an SSTV DX-pedition out to Wyoming and made lots of contacts. WDOAYT, formerly of Iowa, moved to Montana and setting up for a "rare" SSTV stateside contact. WBOWKQ worked 45 countries in one weekend (his wife remembers!). WB9MCF finally found the ten meter bandswitch while W7KPW continues to do a great job as Net Control on the Saturday Ten Meter SSTV Net. WB1ARZ Dick in Connecticut made the "expensive" modification to his new German SC422 2-Memory system to make the "light pen" write finer lines (a BIC pen cap with hole drilled in the end) while rumors persist that Volker Wrasse DL2RZ will unveil his new SC423 Color converter 3-memory system at the Dayton Hamfest this April. ZS6BNT made the March/April issue JA2 Color converter system this fall and says that it is working great! Cheap close-up lens for your camera? Try \$42 All-Site Magnifier lens (4½") available at your local drug store for \$8. Other sizes available from 2" and up. Our congratulations to the W6V10 "Jet Propulsion Lab" group for another year of fine pictures as Voyager 1 passed Saturn on the way to a destination never to be known. Pictures should be returning to the airwaves again in August as Voyager 2 nears Saturn on its voyage out to the planets of Neptune and Uranus. My recommendation to the group is that they not run SSB and cause the pileups of non-SSTVers next time on recognized SSTV operating frequencies and all will be better served. Good work fellows!

The A5 MAGAZINE INTERNATIONAL SSTV CONTEST held Janu ry 17 and 18 should be an interesting "contest" as it was designed to be efficient in quality not quantity of contacts. Winners from each state will be announced as well as those deserving special recognition for WAS, WAC and DX contacts. Please send comments and results. For contest details see NOV/DEC issue.

ATV/SSTV Hamfest get-together will be held at the DAVENPORT, IOWA "WOBXR" HAMFEST on the last weekend in February. A5 Staff will be there featuring SSTV equipment and stations and tapes, Medium Scan demonstrations, Fast Scan Station and demonstration tapes, Satellite TV, etc. Make overnight reservations for Saturday at Quality Motor Inn on Brady Street, Davenport, IA. 146.43 ATV talk-in and 146.28/88 repeater talk-in. See you there!

Fast Scan TV

W9RI John Greve in Illinois is building up his PC FSTV kit package and now has two-color cameras and a Panasonic VTR for a nice Christmas present! WBOZPX and WBOKFB have been exchanging live pictures with WDOEKP in the Cedar Rapids area, AG80 Larry, are you done with your new unit? VHS format ATV Tap exchange group explained elsewhere this issue is gaining popularity. New callsign on Bloomington, Indiana ATV Repeater System; "K9KTH/R" (formerly WR9AMO). Any Chicago ATV'ers active? Send reports!



GLOSSARY OF TRANSISTOR PARAMETER SYMBOLS

hfb Common base A-C forward gain (alpha)
 hfbo Value of hfb at 1KHz
 hfe Common emitter A-C forward gain (beta)
 hfeo Value of hfe at 1 KHz
 fab Common base current gain cutoff freq.
 Freq. at which hfb has decreased to a
 value 3 DB below hfe (where $hfe = .707$
 feo)
 ft Gain Bandwidth. Freq. at which $hfe = 1(0DB)$
 Gpe Common emitter power gain
 fmax Maximum freq. of oscillation freq. at
 which Gpe = 1(0DB)
 K Phase shift factor (Phase shift of current
 in transistor base.

Notes on above: Common base parameters hfbo
 value of hfb at 1KHz will remain constant as
 freq. is increased, until a top limit is reached.
 After top limit hfb begins to drop rapidly. So
 hfb begins to decrease significantly in the re-
 gion of fab. Also above fab the rate of de-
 crease of hfb (with increasing freq.) ap-
 proaches 6 DB per octave.

Common emitter parameter corresponding to fab
 is fae which is the common emitter current gain
 cutoff freq. Fae = freq. at which hft (beta) has
 decreased 3 DB below hfeo. If hfeo and fae
 are known curve, can be plotted for a particu-
 lar transistor. Once curve is constructed, hfe
 at any freq. can be determined.
 If fae is not known, a curve could be construc-
 ted if hfeo and hfe at any freq. above fae were
 known. Thus, to find hfe at any freq. it is
 only necessary to know hfeo and either fae or
 hfe at some freq. greater than fae.

Gain bandwidth, $ft = fae \times hfeo$. In cases where
 hfe is specified at some freq. greater than fae,
 ft can be approximated when specified freq. is
 multiplied by the specified hfe. Note ft is a
 common emitter parameter and should not be used
 with CB calculations. ft is = to the CB pa-
 rameter of fab. Usually ft is slightly less than
 fab.

ft is not necessarily the highest useful freq.
 of operation for a transistor in the common
 emitter mode. f max is used and is the freq. at
 which common emitter power gain is equal to 1.
 A plot of C.E. power gain vs. freq. has the
 same characteristics as the voltage gain plot.

Conversion Between parameters:

$$f_{max} = \frac{\text{freq. of measurement}}{\text{power gain in magnitude}}$$

to find (hfc) beta when (hfb) beta is given:

$$\beta = \frac{\alpha}{1 - \alpha}$$

To find alpha when beta is given:

$$\alpha = \frac{\beta}{1 + \beta}$$

Bias Schemes: Collector-to-base circuit must
 be reverse bias, i.e.: Current should not flow
 between collector and base (leakage almost
 always present).

The emitter base circuit must be forward biased.
 Some current flows at all times in some circuits
 (Oscillators & Class A amps). In others (Class
 C) switches, etc., current only flows when an
 operating signal or trigger is present.

The purpose of the bias circuit is to establish
 collector base emitter voltage and current rela-
 tionships at the operating point of the circuit.
 This operating point is also known as quiescent
 point, 2 point, no signal point, idle point or
 static point.

Feedback: Variable gain can be overcome by
 means of feedback to stabilize gain. Feedback
 method of design make the circuit characteris-
 tics dependent upon the relationship of circuit
 values, rather than on transistor gain charac-
 teristics.

Operating Load I & R: Two major factors deter-
 mine operating load current for a transistor:
 leakage current & max. rated current. Load
 current should be no less than 10 times the
 leakage current. At high end max load current
 should not exceed the maximum power dissipation
 voltage.

Bias with Emitter Feedback: The basic bias net-
 work must maintain the desired base current in
 the presence of temperature (and freq. in some
 cases) changes. This is referred to as bias
 stability. Several methods to provide temp. and
 freq. compensation for bias circuits. One effec-
 tive way is with emitter feedback. Emitter
 feedback: Base current and consequently, col-
 lector current depend upon the differential in
 voltage between base and emitter. If this dif-
 ferential is lowered, less base (& collector)
 current will flow. The opposite is true when
 differential is increased. All current flowing
 through the collector (ignoring leakage) also
 flows through the emitter resistor. The voltage
 drop across the emitter resistor is therefore
 dependent (in part) on the collector current.

DESIGN NOTES

VCBO - Maximum collector voltage (except for RF
 circuits used in transmitters), most transistors
 will be operated with collector VC at some
 voltage less than the source voltage (VCC).
 Typical class A circuit - the collector voltage
 (VC) will be half the source voltage VCC at the
 normal operating point.

Rule: Never design any circuit where the collec-
 tor is connected to a source higher than the max.
 voltage rating, even through a resistance.

continued

Rule: Always allow for some variation in source voltage when an electronic power supply is used.

Note: Referring back to bias schemes: Usually base to emitter has some current flowing at all times. Voltage drop across base-emitter junction is .2 to .3 volts for germanium and .5 to .6 volts for silicon. The lower drops (.2 and .5) will produce some current flow while the higher drops (.3 and .6 volts) will produce heavy current flow. In general, the lower drops produce less current drain and lower signal dissipation.

Alpha: Only a small portion of the emitter current flows into the base (approx. 2%), the other 89% appears in the collector circuit. Mathematically:

$$A_{dc} = \frac{I_c}{I_e} = DC \text{ Alpha}$$

$$a_{ac} = \frac{i_c}{i_e} \quad i_c \text{ and } i_e = \text{signal currents}$$

Alpha will always be less than one because collector current is always less than the emitter current.

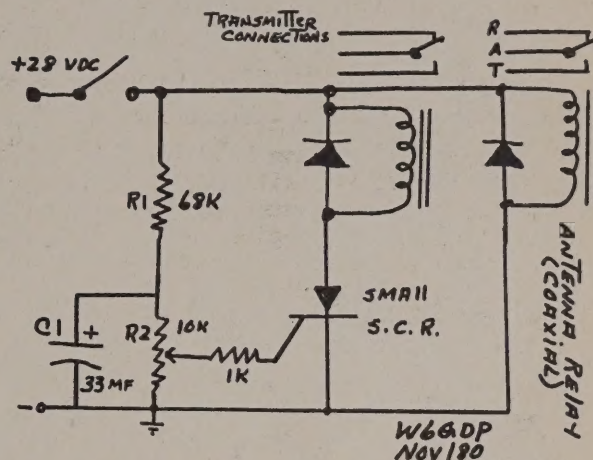
Beta: A small signal introduced in the base circuit causes a larger signal-current to appear in the collector circuit, and we say that a current gain has taken place. The current gain is the ratio between collector current and the base current. This current ratio is called Beta. Mathematically:

$$B_{dc} = \frac{I_c}{I_B} \quad \text{and} \quad B_{ac} = \frac{i_c}{i_B}$$

Most generally, beta refers to the ratio of signal currents (BAC).

TIME DELAY RELAY:

Purpose: to close antenna relay before applying RF power, or turning on transmitter. Adjustment: Set wiper of pot to ground, apply power and advance pot till S.C.R. Triggers causing transmitter relay to close. Advance a few more degrees to assure reliable operation. Values given for approximately 1 to 2 seconds delay. Delay determined by values of R1, R2, and C1.



This circuit, when driven by a 1 watt exciter such as a VHF Eng. TX 432, will put out approx. 8-10 watts peak or 5-6 watts average video. It is currently being used in the Mt. Wilson RPTR to drive the varactor tripler, and in my transmitter to drive a 7289 (2C39A) Tube to 50 W.

Doug K6KMN

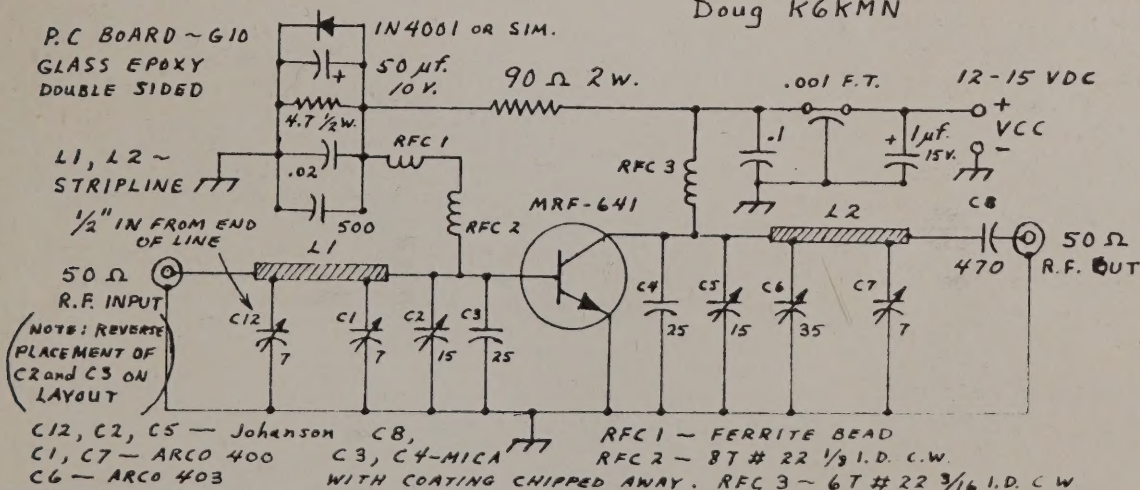
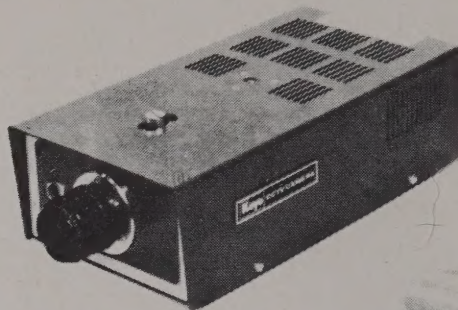
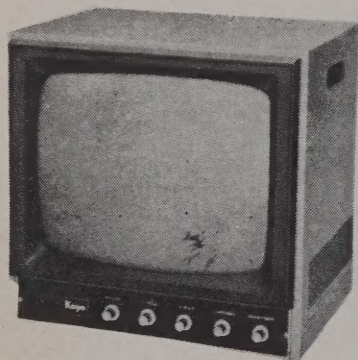


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